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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------|------------------------------|-------------------------------------------------------------------------------|--|--|------------|----------|------------|----------|--------|------------------------------|---------------|-----|-------|-----------------|-----------|------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <h1 style="margin: 0;">CORPORATE STANDARD</h1> | <div style="border-bottom: 1px solid black; padding: 2px;">AA7710203</div> <div style="border-bottom: 1px solid black; padding: 2px;">Rev. No.02</div> <div style="padding: 2px;">PAGE 1 of 2</div> |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <h2 style="margin: 0;">LOW-ALLOY STEEL ELECTRODES FOR SHIELDED METAL ARC WELDING CLASS E8018-B2</h2>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>1.0 SCOPE</b></p> <p>This standard covers low hydrogen type 1 Cr ½ Mo steel arc welding electrodes of Class E8018-B2 to SFA 5.5 of ASME Sec. II Part-C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>2.0 APPLICATION</b></p> <p>These electrodes are used for radiographic quality welds of pressure parts and other components.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>3.0 COMPLIANCE TO STANDARD</b></p> <p>This standard is made to the Class E8018-B2 of SFA 5.5 of ASME Section-II C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>4.0 CHEMICAL COMPOSITION</b></p> <p>As per SFA 5.5 of ASME Section-II C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>5.0 MECHANICAL PROPERTIES</b></p> <p>As per SFA 5.5 of ASME Section-II C, except soaking time for stress relieving is 120 minutes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>6.0 FILLET TEST</b></p> <p>As per SFA 5.5 of ASME Section-II C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>7.0 RADIOGRAPHIC TEST</b></p> <p>As per SFA 5.5 of ASME Section-II C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>8.0 METHODS OF MANUFACTURE</b></p> <p>The welding consumable may be manufactured by any method which will yield the requirements of this standard.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>9.0 STANDARD FORMS, TOLERANCES AND FINISH</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>9.1</b> The standard size shall be 2.0, 2.5, 3.15, 4.0, 5.0 mm diameter.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>9.2</b> The tolerance on the diameter of core wire shall be as per SFA 5.5 of ASME Section-II C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <p><b>9.3 Core Wire &amp; Covering</b></p> <p>The electrodes shall meet the requirements of clause 3.2 of SFA 5.02.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                |                                                                                                                                                                                                     |                                                                               |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3" style="padding: 5px;"> Revisions:<br/>Clause 19.4 of MOM of MRC-W </td> <td colspan="3" style="text-align: center; padding: 5px;"> <b>APPROVED:</b><br/> INTERPLANT MATERIAL RATIONALISATION<br/> COMMITTEE – MRC(W) </td> </tr> <tr> <td style="width: 20%; padding: 5px;">Rev. No.02</td> <td style="width: 20%; padding: 5px;">Amd. No.</td> <td style="width: 20%; padding: 5px;">Reaffirmed</td> <td style="width: 20%; padding: 5px;">Prepared</td> <td style="width: 20%; padding: 5px;">Issued</td> <td style="width: 20%; padding: 5px;">Dt. of 1<sup>st</sup> Issue</td> </tr> <tr> <td style="padding: 5px;">Dt:08-09-2014</td> <td style="padding: 5px;">Dt:</td> <td style="padding: 5px;">Year:</td> <td style="padding: 5px;">HPEP, Hyderabad</td> <td style="padding: 5px;">Corp. R&amp;D</td> <td style="padding: 5px;">01-12-1990</td> </tr> </table> |                                                |                                                                                                                                                                                                     | Revisions:<br>Clause 19.4 of MOM of MRC-W                                     |           |                              | <b>APPROVED:</b><br>INTERPLANT MATERIAL RATIONALISATION<br>COMMITTEE – MRC(W) |  |  | Rev. No.02 | Amd. No. | Reaffirmed | Prepared | Issued | Dt. of 1 <sup>st</sup> Issue | Dt:08-09-2014 | Dt: | Year: | HPEP, Hyderabad | Corp. R&D | 01-12-1990 |
| Revisions:<br>Clause 19.4 of MOM of MRC-W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                |                                                                                                                                                                                                     | <b>APPROVED:</b><br>INTERPLANT MATERIAL RATIONALISATION<br>COMMITTEE – MRC(W) |           |                              |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| Rev. No.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Amd. No.                                       | Reaffirmed                                                                                                                                                                                          | Prepared                                                                      | Issued    | Dt. of 1 <sup>st</sup> Issue |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |
| Dt:08-09-2014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Dt:                                            | Year:                                                                                                                                                                                               | HPEP, Hyderabad                                                               | Corp. R&D | 01-12-1990                   |                                                                               |  |  |            |          |            |          |        |                              |               |     |       |                 |           |            |

**9.4 Exposed Core**

The electrodes shall meet the requirements of clause 3.3 of SFA 5.02.

**10.0 IDENTIFICATION**

All electrodes shall be identified as per SFA 5.5.

**11.0 TEST REQUIREMENTS**

Test requirements as per SFA 5.5 of ASME Section-II C. Batch/Lot classification shall be Class C1 and level of testing shall be Schedule 4 or I as per SFA 5.01.

**12.0 TEST CERTIFICATES**

The supplier shall submit 3 copies of original test certificates in English giving the following information.

1. BHEL Purchase Order No.
2. Supplier's Name, Brand Name and Size
3. BHEL Standard No: AA7710203 and AWS class
4. Batch Number & Quantity
5. Test results as per clause 11.0 of this standard

**13.0 ACCEPTANCE**

Acceptance shall be based on as per the requirement of this standard. Additional requirements if any shall be as agreed between supplier and purchaser.

**14.0 PACKING**

The electrodes shall be suitably packed to ensure against damage during shipment or storage under normal condition.

**15.0 MARKING**

Each carton shall have the following information printed on them.

1. Brand name
2. AWS specification and class
3. Size
4. Batch No. and Date of manufacture.
5. Quantity and Net weight
6. Electrode drying requirements

**16.0** For rationalized sizes and material codes, refer CMCC of Welding Consumables (for BHEL reference only)**17.0 REFERRED STANDARDS** (Latest Publications including Amendments)

- 1) ASME Section-II C

|                                                                                                                                      |                    |            |                                                                     |           |                              |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|---------------------------------------------------------------------|-----------|------------------------------|
| <div><div>बी एच ई एल</div><div>BHEL</div></div>                                                                                      | CORPORATE STANDARD |            | AA7710205                                                           |           |                              |
|                                                                                                                                      |                    |            | Rev. No.02                                                          |           |                              |
|                                                                                                                                      |                    |            | PAGE 1 of 2                                                         |           |                              |
| LOW-ALLOY STEEL ELECTRODES FOR SHIELDED METAL ARC WELDING CLASS E9018-B3                                                             |                    |            |                                                                     |           |                              |
| 1.0 SCOPE                                                                                                                            |                    |            |                                                                     |           |                              |
| This standard covers low hydrogen type 2 ¼ Cr 1 Mo steel arc welding electrodes of Class E9018-B3 to SFA 5.5 of ASME Sec. II Part-C. |                    |            |                                                                     |           |                              |
| 2.0 APPLICATION                                                                                                                      |                    |            |                                                                     |           |                              |
| These electrodes are used for radiographic quality, welds of Pressure parts and other components.                                    |                    |            |                                                                     |           |                              |
| 3.0 COMPLIANCE TO STANDARD                                                                                                           |                    |            |                                                                     |           |                              |
| This Standard is made to the Class E9018-B3 of SFA 5.5 of ASME Section-II C.                                                         |                    |            |                                                                     |           |                              |
| 4.0 CHEMICAL COMPOSITION                                                                                                             |                    |            |                                                                     |           |                              |
| As per SFA 5.5 of ASME Section-II C.                                                                                                 |                    |            |                                                                     |           |                              |
| 5.0 MECHANICAL PROPERTIES                                                                                                            |                    |            |                                                                     |           |                              |
| As per SFA 5.5 of ASME Section-II C, except soaking time for stress relieving is 120 minutes.                                        |                    |            |                                                                     |           |                              |
| 6.0 FILLET TEST                                                                                                                      |                    |            |                                                                     |           |                              |
| As per SFA 5.5 of ASME Section-II C.                                                                                                 |                    |            |                                                                     |           |                              |
| 7.0 RADIOGRAPHIC TEST                                                                                                                |                    |            |                                                                     |           |                              |
| As per SFA 5.5 of ASME Section-II C.                                                                                                 |                    |            |                                                                     |           |                              |
| 8.0 METHODS OF MANUFACTURE                                                                                                           |                    |            |                                                                     |           |                              |
| The welding consumable may be manufactured by any method which will yield the requirements of this standard.                         |                    |            |                                                                     |           |                              |
| 9.0 STANDARD FORMS, TOLERANCES AND FINISH                                                                                            |                    |            |                                                                     |           |                              |
| 9.1 The standard size shall be 2.0, 2.5, 3.15, 4.0, 5.0 mm diameter.                                                                 |                    |            |                                                                     |           |                              |
| 9.2 The tolerance on the diameter of core wire shall be as per SFA 5.5 of ASME Section-II C.                                         |                    |            |                                                                     |           |                              |
| 9.3 Core Wire & Covering                                                                                                             |                    |            |                                                                     |           |                              |
| The electrodes shall meet the requirements of clause 3.2 of SFA 5.02.                                                                |                    |            |                                                                     |           |                              |
| Revisions:<br>Clause 19.4 of MOM of MRC-W                                                                                            |                    |            | APPROVED:<br>INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC(W) |           |                              |
| Rev. No.02                                                                                                                           | Amd. No.           | Reaffirmed | Prepared                                                            | Issued    | Dt. of 1 <sup>st</sup> Issue |
| Dt:08-09-2014                                                                                                                        | Dt:                | Year:      | HPEP, Hyderabad                                                     | Corp. R&D | 01-12-1990                   |

**9.4 Exposed Core**

The electrodes shall meet the requirements of clause 3.3 of SFA 5.02.

**10.0 IDENTIFICATION**

All electrodes shall be identified as per SFA 5.5.

**11.0 TEST REQUIREMENTS**

Test requirements as per SFA 5.5 of ASME Section-II C. Batch/Lot classification shall be Class C1 and level of testing shall be Schedule 4 or I as per SFA 5.01.

**12.0 TEST CERTIFICATES**

The supplier shall submit 3 copies of original test certificates in English giving the following information.

1. BHEL Purchase Order No.
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3. BHEL Standard No: AA7710205 and AWS class.
4. Batch Number & Quantity
5. Test results as per clause 11.0 of this standard

**13.0 ACCEPTANCE**

Acceptance shall be based on as per the requirement of this standard. Additional requirements if any, shall be as agreed between supplier and purchaser.

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The electrodes shall be suitably packed to ensure against damage during shipment or storage under normal condition.

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- 1) ASME Section-II C