# GOVERNMENT OF INDIA
# (Ministry of Railways)

# SPECIFICATION FOR 19mm (¾") DIA COPPER COATED GRAPHITE ELECTRODE FOR ARC GOUGING

## (PL No. 76980662)

Issued by

**MECHANICAL DRAWING OFFICE**
**RAIL WHEEL FACTORY**
**YELAHANKA, BANGALORE-560 064**
**INDIA**

| | | | |
|---|---|---|---|
| 27.2.08 | | 26/2/08 | 22/2/08 |
| CME | CWE/W | Dy. CME/Mfg | SSE/D |
| APPROVED BY | REVIEWED BY | VERIFIED BY | PREPARED BY |

Job. No.5105

# SPECIFICATION FOR 19 mm (¾") DIA. COPPER COATED GRAPHITE ELECTRODE FOR ARC GOUGING

## 1.0 SCOPE

1.1 This specification covers the design and manufacture and supply of Copper Coated Graphite Electrode to Rail Wheel Factory, Yelahanka, Bangalore-560064, Karnataka, India.

## 2.0 GENERAL DESCRIPTION

2.1 Copper Coated Graphite Electrode for Arc Gouging as per enclosed Drawing No. RWF/SK/MW-269, alt. 'd'

## 3.0 JOB REQUIREMENT

3.1 Copper Coated Graphite Electrodes are required to remove the Riser stubs from the Cast Steel Wheel in such a manner that Stubs do not protrude excessively, and the wheel is not gouged.

## 4.0 TECHNICAL DATA

| | | | |
|---|---|---|---|
| 4.1 | Material | : | Graphite with Copper coating. |
| 4.2 | Dimensions | : | As per Drawing given in Clause 2.1 |

4.3 Two consecutive electrodes must fit snugly for un-interrupted working. All the electrodes in the whole lot should have interchangeability as far as fitting of male in female socket is concerned. Suitable taper may be given on tip and the hole if so desired to achieve this purpose.

| | | | |
|---|---|---|---|
| 4.4 | Density of Electrode (without Copper Coating) | : | 1.65 gm/cm$^3$ min. |
| 4.5 | Density of Electrode (with Copper Coating) | : | 1.90 gm/cm$^3$ (Approx.) |
| 4.6 | Specific Resistance (without Copper Coating, excluding tip length). | : | 2.5 x 10$^{-3}$ Ohm cm(Max.) |

| | | | |
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| | | | |
|---|---|---|---|
| 4.7 | Straightness over nominal length | : | Variation in straightness should not exceed 0.005 times the nominal length i.e., ½% of nominal length. |
| 4.8 | Current carrying capacity | : | 1500 amps DC (min) during Arc gouging (Normal operating range 1200-1500 amps) |
| 4.9 | Thickness of Copper coating | : | 0.20 mm min. |

## 5.0 PERFORMANCE PARAMETERS

| | | | |
|---|---|---|---|
| 5.1 | Expected electrode consumption | : | 1 electrode maximum per wheel |
| 5.2 | Expected time for sprue washing 1 wheel under normal operating condition | : | 2 minutes |

5.3 The electrode joints should not get red hot in use, nor should they cause damage to the electrode holder due to overheating.

5.4 The Electrode should not split or crack while in use.

## 6.0 INSPECTION

6.1 The specifications mentioned at 4.4 to 4.6 are only for manufacturing guidance, and the manufacturer shall furnish Test Certificate giving the values for his product. The firm must guarantee the consumption rate of 1 Electrode per wheel.

6.2 Parameters under clauses 4.8, 4.9, 5.1, 5.2, 5.3 and 5.4 will be validated during field tests.

| | | | |
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## 7.0 ACCEPTANCE

7.1 All the parameters except those specified for field test will be checked at firm's premises.

7.2 The field test shall be done at RWF on samples drawn from each lot supplied.

| | | |
|---|---|---|
| Lot size | : | 5000 or part thereof |
| Sample size | : | 300 |

7.3 The material will be accepted only after satisfactory completion of tests at 7.1 and 7.2.

7.4 The average Consumption of electrode per wheel for each lot will be based on the trials done on the sample size specified in Clause 7.2. This average consumption will be used for working out penalties detailed in Clause 7.5.

7.5 RWF reserve the right to accept consignment where consumption exceeds the maximum specified in Clause 5.1. Acceptance of such consignment will be with application of penalty as specified in the special conditions of contract.

## 8.0 PACKING

8.1 The electrodes shall be wrapped in packing paper and then packed in cardboard boxes of 20 (twenty) electrode each. The packing shall be such that no damage/deterioration takes place during handling, transit and storage.

## 9.0 DESTRUCTIVE TEST

| | | |
|---|---|---|
| Sampling norm | : | 4 pieces |
| Acceptance criteria | : | All Four should pass. |

| | | | |
|---|---|---|---|
| 22.2.08 | | 26/12/08 | 25/2/08 |
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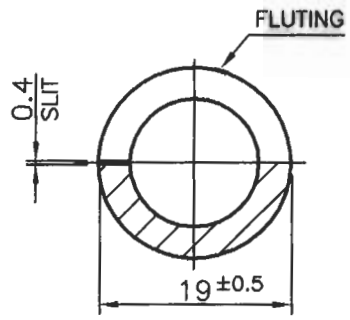
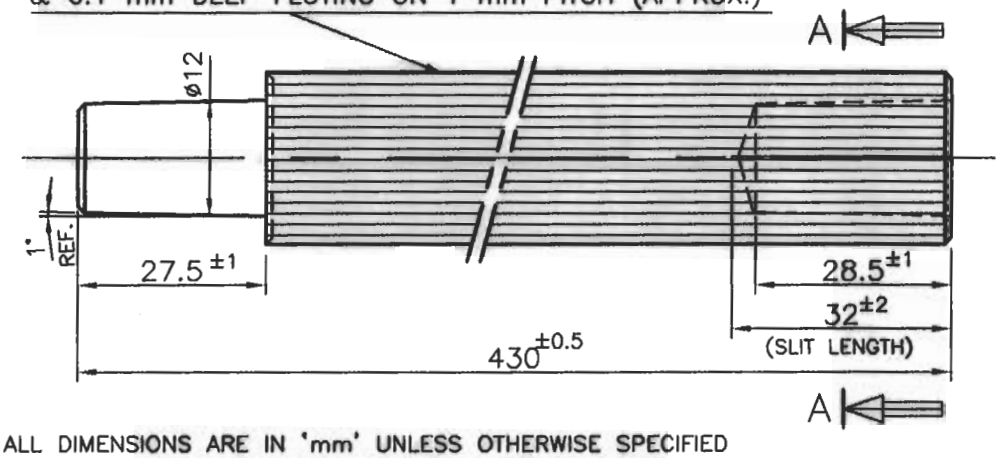
| ALT | DESCRIPTION | JOB No. | APPROVED |
|---|---|---|---|
| ⓓ | DRAWING DESCRIPTION REVISED &REDRAWN BASED ON 25.5 DIA ELECTODE DRAWING | 5102 | |




SECTION–'AA'

SURFACE COATED WITH 0.2 mm THICK COPPER
& 0.1 mm DEEP FLUTING ON 1 mm PITCH (APPROX.)




NOTE
1. ALL DIMENSIONS ARE IN 'mm' UNLESS OTHERWISE SPECIFIED
2. DIMENSIONS FOR TIP & HOLE ARE ONLY FOR GUIDANCE
3. PERFECT FIT AND INTERCHANGABILITY OF ALL THE ELECTRODES IN THE LOTS IS THE ULTIMATE REQUIREMENT
4. TAPER SHALL BE GIVEN ON TIP AND THE HOLE FOR TIGHT FITTING OF ELECTRODE

IS:2102 (PART–1)–1993 OR ISO 2768–1: 1989

| PERMISSIBLE DEVIATION FOR BASIC SIZE RANGE | | | | | | | | | | PERMISSIBLE DEVIATION FOR BROKEN EDGES (EXTERNAL RADII AND CHAMFER HEIGHTS) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOLERANCE CLASS | | 0.5[1] UPTO 3 | OVER 3 UPTO 6 | OVER 6 UPTO 30 | OVER 30 UPTO 120 | OVER 120 UPTO 400 | OVER 400 UPTO 1000 | OVER 1000 UPTO 2000 | OVER 2000 UPTO 4000 | 0.5[1] UPTO 3 | OVER 3 UPTO 6 | OVER 6 |
| DESIG. | DESCRIPTION | | | | | | | | | | | |
| f | FINE | ±0.05 | ±0.05 | ±0.1 | ±0.15 | ±0.2 | ±0.3 | ±0.5 | – | ±0.2 | ±0.5 | ±1 |
| m | MEDIUM | ±0.1 | ±0.1 | ±0.2 | ±0.3 | ±0.5 | ±0.8 | ±1.2 | ±2 | | | |
| c | COARSE | ±0.2 | ±0.3 | ±0.5 | ±0.8 | ±1.2 | ±2 | ±3 | ±4 | ±0.4 | ±1 | ±2 |
| v | VERY COARSE | – | ±0.5 | ±1 | ±1.5 | ±2.5 | ±4 | ±6 | ±8 | | | |

1)FOR NOMINAL SIZES BELOW 0.5 mm, THE DEVIATIONS SHALL BE INDICATED ADJACENT TO THE RELEVANT NOMINAL SIZE(S)

PERMISSIBLE DEVIATION FOR ANGULAR DIMENSIONS (mm )

| TOLERANCE CLASS | | PERMISSIBLE DEVIATIONS FOR RANGES OF LENGTHS,IN mm OF THE SHORTER SIDE OF ANGLE CONCERNED | | | | |
|---|---|---|---|---|---|---|
| DESIG. | DESCRIPTION | UPTO 10 | OVER10 UPTO 50 | OVER50 UPTO 120 | OVER 120 UPTO 400 | OVER 400 |
| f | FINE | ±1° | ±0° 30' | ±0° 20' | ±0° 10' | ±0° 5' |
| m | MEDIUM | | | | | |
| c | COARSE | ±1° 30' | ±1° | ±0° 30' | ±0° 15' | ±0° 10' |
| v | VERY COARSE | ±3° | ±2° | ±1° | ±0° 30' | ±0° 20' |

SURFACE ROUGHNESS VALUE

| Gr. NUMBER | N1 | N2 | N3 | N4 | N5 | N6 | N7 | N8 | N9 | N10 | N11 | N12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ra. um | 0.025 | 0.05 | 0.1 | 0.2 | 0.4 | 0.8 | 1.6 | 3.2 | 6.3 | 12.5 | 25 | 50 |

ASSEMBLY

APPROVED DY.CME/MFG

# INDIAN RAILWAYS

## ø19 COPPER COATED GRAPHITE ELECTRODE FOR ARC GOUGING

## RAIL WHEEL FACTORY

BANGALORE

REF.
SUPERSEDED BY
SUPERSEDES

| SCALE | | | |
|---|---|---|---|
| 1:1 | SSE/D | | 25/2/08 |
| | CHD | Chadd | 26.02.08 |
| | DRN | C. BOS | 15.02.08 |
| ALT. | ⓒⓓ | | |

DRG No. RWF/SK/MW–269

JOB No.5102