


BHEL Tender Enquiry :: 15E00__ Dt: __.05.2015 Due On: __.06.2015
BHEL NIT No :: _____ Dt _____
Tender Item :: "SILVER PLATING AS PER TENDER"

TENDER COVER PAGE (CHECK LIST)

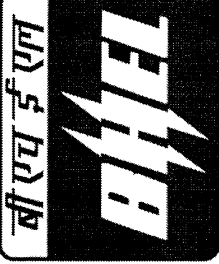
This Tender consists of **36 pages** as below:

- Tender Cover Page (Check List) - Page- 1
 - NIT - Page- 2
 - BHEL Tender Enquiry - Page- 3
 - Qualifying Criteria (ESSENTIAL) Annexure-4 - Page- 4
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 - Technical cum Commercial Terms & Conditions Annexure-2 - Page- 6 to 9
 - Unpriced / Price Bid Format Annexure-3 - Page- 10
-
- DOCUMENTS / STANDARDS / PACKING INSTRUCTIONS / ANNEXURES:
 - i. Quality Assurance Plan - Page- 11 to 14
 - ii. Public Procurement Policy Annexure-X - Page-15
 - iii. Product Standard Busduct Engineering (BHE-PACK-SP-001 REV-01) - Page- 16 to 17
 - iv. (Product Standard Switchgear Engineering Division (SG15600 REV-03) - Page- 18 to 35
 - v. General Instruction For Silver Plating On Aluminium Conductor & Flexible - Page- 36

36 pages


एस० बी० जायसवाल S.B. Jaiswal
अभि. (सापत्री प्रबंधन) Engrg. (Mat. Mngt)
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उत्तराखण्ड-263153 Uttarakhand-263153

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भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार की उपक्रम)

BHARAT HEAVY ELECTRICALS LIMITED

(A Govt. Of India Undertaking)

Component Fabrication Plant, Rudrapur - 263153

Distt. Udham Singh Nagar (Uttarakhand)

Tel: (05944) 257221/257205, Fax: (05944)243605

E-mail: shilinand@bhel.in / shyamb@bhel.in

ANNUAL FRAME WORK AGREEMENT FOR

I. FABRICATION OF SEGREGATED PHASE (SP) BUS DUCTS (ALUMINIUM) ON JOB

WORK BASIS)

OPEN TENDER ENQUIRY NO.: 15E0035 dt: 21.05.15 due on: 16.06.15

BHEL NIT No.: _____ dt: _____

6cm

II. SILVERPLATING


OPEN TENDER ENQUIRY NO.: 15E0036 dt: 22.05.15 due on: 16.06.15

BHEL NIT No.: _____ dt: _____

Sealed tenders in two bids are invited from reputed suppliers for “Annual Frame Work Agreement for above notified enquiries. Detailed tender documents can be obtained from the office of the undersigned either in person or can be downloaded from BHEL website www.bhel.com or CPP portal www.eprocure.gov.in. Fully completed offers must reach BHEL RUDRAPUR office not later than 1400 Hrs on tender due date on __.06.15 and techno-commercial bid shall be opened on __.06.15 at 1500 hours. All corrigenda, addenda, amendments, time extensions, clarifications etc. if any to the tender will be hosted on BHEL website (www.bhel.com) & CPP portal www.eprocure.gov.in only. Bidders should regularly visit website(s) to keep themselves updated.


DGM (MM/CS)

6cm.


एस.बी. मीसरा
अभि. (सामग्री प्रबंधन) Engg. (Met. Mang.)
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By Courier/Regd. Post/Speed Post

| | | | |
|---|--|--|------------------------|
|  | TENDER ENQUIRY (Supplier's Copy) | Enquiry no. & Date | Due date for Quotation |
| To, | | 15E0036 22.05.15 | 16.06.15 |
| OPEN TENDER ENQUIRY | | Bharat Heavy Electricals Ltd. (A Govt. of India Under Taking) Rudrapur - 263153 Distt. Udham Singh Nagar (Uttarakhand) India Phone no.- 05944-241400/242326 Fax no. 05944-243605 e-mail : shilanand@bhel.in manohar@bhel.in | |

| Sl.No. | Description | Unit | Req. Qty. | Delivery Schedule |
|--------|--|------|-----------|--------------------------|
| | ANNUAL FRAME WORK AGREEMENT FOR SILVER PLATING ON AL.SPLICE PLATE/AL.FLATE/AL/FLEXIBLE | SQCM | 75 LACS | AS MENTIONED IN ANNEX-1. |
| | ANNUAL FRAME WORK AGREEMENT FOR SILVER PLATING ON AL.CONDUCTORS/PALM/BLANKING PLATE | SQCM | 75 LACS | AS MENTIONED IN ANNEX-1 |
| | Terms & Conditions | | | |
| 1 | Technical terms & conditions as per annexure-1 | | | |
| 2 | Technical cum commercial terms & conditions as per annexure-2 | | | |
| 3 | Offer shall be invited in Two Bid System containing: A) Techno-commercial bid consisting of: i) Technical Offer ii) Unconditional Signed Copies of BHEL Terms & Conditions and qualifying criteria as per Annexure- 4 iii) Un-priced Copy of Price Bid in Annexure-3 iv) Quantity as per Annexure-1 B) Price Bid as per Annexure-3 | | | |
| 4 | To go for <u>REVERSE AUCTION EVENT</u> subsequent to techno-commercial suitability of offers. | | | |
| 5 | Late & Delayed offers shall not be considered even if post by speed/regd. Post before due date | | | |
| 6 | Validity of offer shall be 03 months from the date of opening of tenders | | | |
| 7 | Bidder shall immediately contact for any conflicting & contradicting terms, if any and get it clarified the doubts, if any. | | | |
| 8 | Documents/Standards/Packing Instructions/ Annexures as per tender | | | |

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Signature

Dear Sir,

Please submit your lowest quotation, subject to our terms and conditions written overleaf for the above mentioned items so as to reach us on or before the due date by 2.00 P.M.

Enquiry No. & Due Date should be superscribed on the envelope containing the quotation

श्री श्री जयसवाल S.B. Jaiswal
अभि (साधु प्रबंधन) Engg.(Mat. Mangl)
कॉन्सल्टिंग प्रा. लि.
बलरामपुर-263153 Uttarakhand-263153

FOR BHARAT HEAVY ELECTRICALS LTD.
(SIGN. & NAME)

Qualification Criteria

Annexure- 4

| Sl. No. | Qualifying Criteria (ESSENTIAL) | Documents in support of Qualifying |
|---|--|--|
| 1 | <p>Offers shall be submitted in double bid i.e. Techno-commercial bid and Price bid in separate sealed covers.</p> <p>Offers to be submitted in two separate envelopes subscribed as</p> <p>(I) Technical bid containing technical offer along with Commercial Term and conditions + un-priced copy of the price bid only</p> <p>(II) Price bid containing only price of the items.</p> <p>Offers submitted in single bid shall not be considered.</p> <p>Offer submitted in single bid shall be rejected.</p> | Compliance |
| 2 | <p>Works of bidder for silver plating should be within 100 KMs of Bhopal, Jhansi, Bareilly and Rudrapur for items at S.No.-2 only.</p> | Undertaking for Works distance from mentioned locations. |
| 3 | <p>Bidder should have Silver Plating tank according to our job sizes mentioned in SL No 17 of ANNEXURE-2 of BHEL TECHNICAL CUM COMMERCIAL TERMS AND CONDITIONS and plating facility as per BHEL Product Standrds SG15600 R03 and BHEL/PACK/SP/001 R01.</p> | Essential Document / Certificate |
| Note:- | <p>1. If required BHEL will do the inspection / assesment of works of Non PMD bidders before clearance of their technical bid. After successful qualification their offer will be considered for further processing. In case of disqualification their offer will not be considered for further action.</p> <p>2. Bidder who fails to qualify any one of the above conditions from sl. no. 1 to 3, his offer shall be rejected without assigning any reasons whatsoever.</p> | |
| <p>Signature of Bidder (with office seal)</p> | | |

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S.B. Jaiswal
 एस.बी. जयसवाल S.B. Jaiswal
 अभि. (साधनी प्रकल्प) Engg (Mat. Mang.)
 पी.एच.ई.एल.-रुद्रपुर BHEL-Rudrapur
 उत्तराखण्ड-263153 Uttarakhand-263153

Technical Terms & Conditions

Silver Plating on Al. busduct items as follows:

| Sl. No. | Material Description | Qty. (Sq. cm) |
|---------|--|----------------|
| 1 | Silver Plating on Al. splice plates/ Al. Flat/ Al. Flexible including handling, polishing, buffing on items on F.O.R. BHEL-Rudrapur basis.(Jobs shall be lifted from BHEL-Rudrapur and shall be delivered back to BHEL-Rudrapur) The silver plating shall be 13-15 microns. Silver plating shall be done as per drg. No.45410001025 and as per product standard-SG15600 REV.03 & QAP. | 75 Lacs |
| 2 | Silver Plating on Al. conductor/ Palm/Blanking plate including handling, polishing, buffing on items on Ex-works basis. The silver plating shall be 13-15 microns. Silver plating shall be done as per drg. No.45410001025 and as per product standard-SG15600 REV.03 & QAP. | 75 Lacs |

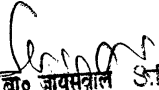
- Quality Assurance Plan no.-QAP/BD/164 R02.(copy attached)
- Composition of Components to AA 12329

The Chemicals composition of material when analysed in accordance with IS: 504 (Methods for chemical analysis of aluminium and its alloys shall be follows:

| <u>Elements</u> | <u>Percent</u> | |
|---------------------|----------------|-------------|
| | <u>Min.</u> | <u>Max.</u> |
| Magnesium | 0.4 | 0.9 |
| Silicon | 0.3 | 0.7 |
| Manganese | - | 0.03 |
| Copper | - | 0.05 |
| Iron | - | 0.50 |
| Aluminium remainder | | |

Other technical cum commercial points are covered in Annexure-II.

**For & On behalf of the Bidder/ Contractor
(Office Seal)**

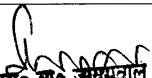

 एस.बी. जयसवाल S.B. Jaiswari
 अभि. (सामग्री प्रबंधन) Engg.(Mat. Mgng.)
 बी.एच.ई.एल.-रुद्रपुर BHEL-Rudrapur
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BHEL TECHNICAL CUM COMMERCIAL TERMS AND CONDITIONS

(To be returned in original along with Techno-Commercial Offer after duly filling-in and affixing Signature and seal on all pages)

| Sl. No. | TERMS | BHEL ACCEPTABLE TERM | BIDDER'S CONFIRMATION |
|---------|---|---|-----------------------|
| 01 | Name & address of the Bidder: (As Required in purchase Order) | | |
| 02 | Price Basis | Rates should be quoted for entering into rate contract for 01 year. Rates quoted shall be firm for 01 year for ordering. Multiples Orders shall be placed during currency of year on firm rates | Agreed |
| 03 | Validity | Valid up to 03 months from the date of opening of techno-Commercial Bid. | Agreed |
| 04 | Destination | <p>1. Rates shall be quoted for F.O.R. BHEL Rudrapur basis (Jobs shall be lifted from BHEL-Rudrapur and shall be delivered back to BHEL-Rudrapur after Silver Plating) for silver plating on Al. Splice plate/Al. Flat/Al. Flexible connections. Total three parties(L-1+2) shall be finally considered for scope of work and at least 60% work will be given to L-1 and balance work will be distributed between other two parties(25% and 15% to L-2 & L-3) who accept L-1 rates. L-1 rates will be counter offered to L-2 & L-3 and if the same will not be accepted by L-2 & L-3 then we will go on next parties i.e. L-4, L-5 and so on.</p> <p>2. Rates shall be quoted Ex-works basis for silver plating on Al. conductor/Palm/Blanking plate. Items to be silver plated will be sent by BHEL/BHEL's Fabricators (Location wise) and silver plated items will be lifted by BHEL/BHEL's fabricators. Work will be distributed depending upon the fabrication subcontracting orders and as per geographical locations. As per geographical location minimum one party and maximum two parties shall be finalized for each location i.e. Rudrapur/Bareilly/Jhansi/Bhopal.</p> | Agreed |


 एस.बी. जैसवाल • S.B. Jaiswal
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 फोन नं. 263153 U.P. नं. 263153

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| | | | |
|----|-----------------------------|---|--------|
| 05 | Delivery Period | Delivery time should be 1 month from the date of receipt of material for item -1 of annexure-1 and 15 days after receipt of material for item-2 of annexure-1. | Agreed |
| 06 | PVC Clause | Rates should be subject to Price Variation Clause (PVC) at the base price of Silver (99.9% purity) @ Rs. 37120/- As per Mumbai Bullion market for the month of Dec.'2014. For any change in this rate, the silver closing rate of Mumbai Bullion market on the 1 st working day of the calendar month as published in the next day's edition of "The Economics Times" or "The Financial Express" shall be effective for supplies till the end of that month in which the plated components is to be supplied to BHEL/BHEL's fabricators. | Agreed |
| 07 | PVC Ratio | PVC ratio shall be 1:0.7. | Agreed |
| 08 | Bid System | Offers shall be submitted in double bid i.e. Techno-commercial bid and Price bid in separate sealed covers. Offers to be submitted in two separate envelopes subscribed as (I) Technical bid containing technical offer along with Commercial Term and conditions + un-priced copy of the price bid only (II) Price bid containing only price of the items. Offers submitted in single bid shall not be considered. Offer submitted in single bid shall be rejected. | Agreed |
| 09 | BHEL Reserves the right to: | To place the order on more than one bidder, depending upon the fabrication subcontracting orders. To go for reverse auction instead of opening the sealed price bid, which will be decided after techno-commercial evaluation Accept/ reject, any or all tenders or part thereof without assigning any reasons. To terminate the R/c by giving a notice period of 15 days if the performance of the party is not found to be satisfactory. To counter offer all the techno-commercial qualified bidders and participated in Reverse Auction. | Agreed |
| 10 | Geographical location | Works of supplier for silver plating should be within 100 KMs of Bhopal, Jhansi, Bareilly and Rudrapur for items at S.No.-2 only. | Agreed |
| 11 | Payment Terms | 100% payment shall be made in 45 days after receipt and verification of material at BHEL store. Any deviation in payment terms will be loaded @ (SBI PLR rate + 6 %) annual interest for comparing standing. The price as mentioned at sl. No. 06, shall be applicable for payment. In case of deviation in date of dispatch of Plated | Agreed |

| | | | |
|----|---|--|--------|
| | | items from the agreed delivery date as per PO, The price applicable within the PO delivery time or as applicable at the time of dispatch of plated items, whichever is lower shall be applicable. | |
| 12 | Penalty: | The delivery of the goods shall be made strictly as per time specified in delivery schedule. Failure to supply within this period will make the supplier liable to an unconditional penalty of 0.5 % (Half Percent) of the price of the goods in arrears per week subject to maximum of 10% of the order value at the discretion of the purchaser. If penalty is applicable for duration of less than a week, penalty @ 0.5 % of the basic value will be charged. | Agreed |
| 13 | Test Certificate | TC shall be submitted with material. | Agreed |
| 14 | Silver plating procedure/Inspection procedure/Packing | As per attached Product Standard SG15600 REV.03 and drg. No.- 45410001025 /Checklist/Packing instructions as per BHE/Pack/SP/001 REV01 | Agreed |
| 15 | Inspection | 100% inspection shall be done by BHEL/BHEL's representative before dispatch. | Agreed |
| 16 | Important IS: | IS:1959 (Silver Anode) IS:3203(Thickness) IS: 1771(Adhesion/Tarnish Resistance test) For all other required IS details vide Product standard SG15600 REV.03 | Agreed |
| 17 | Size and Type of Job | <u>For item at S.No.-1:</u> Job type- Square, Flat, Rectangular Size of job:- Length-2000mm(Max.) Width-500mm(Max.) Weight-50-70 Kg(Max.) <u>For item at S.No.-2:</u> Job Type- Octagon, Square, Flat, Rectangular, I, Z & U type or as per design. Size of Job: Height- 4000 mm(Max.), Width- 1000 mm (Max.), Depth- 1000 mm (Max.) Weight of Job: 500 Kg. (Max.) <u>Note:-</u> For palm involving multiple sides (like octagon, square shape etc.), BHEL will be free to ask for plating on only one side of the palm. In that case, vendor will have to make suitable masking arrangement with no extra cost implication to BHEL. <u>Note:-Vendor should have Silver Plating tank according to our job sizes.</u> | Agreed |

| | | | |
|----|--|--|--------|
| 18 | Reduction of thickness of silver plating | BHEL will be free to ask for silver plating with reduced thickness of coating upto 5 micron. In that case suitable reduction in the agreed rate(of 13 micron thickness) shall be done as per below mentioned formula, in line with PVC formula: Reduction in base rate per micron thickness/cm2= <u>(Agreed lowest rate for 13 micron/cm2)*0.7</u> 13 | Agreed |
| 19 | Opening of tender | All Tender must reach this office / deposited in the tender box before 2 P.M.. The tender will be opened on the due date at 3:00 P.M. in the office of the undersigned in the presence of tenderer who may like to be present. “ LATE AND DELAYED TENDER WILL BE REJECTED” | Agreed |
| 20 | Testimonials | Income tax clearance certificates and other testimonial from Bank or other authorities may called by us wherever necessary. | Agreed |
| 21 | Quantities | All the quantities in the enquiry may not be ordered. Supplier should be prepared to accept orders of reduced quantity without any extra charges. | Agreed |
| 22 | Monthly capacity | Supplier to mention their monthly silver plating capacity in cm ² .(Amendment in Annexure-II) | Agreed |
| 23 | | Bharat Heavy Electricals Limited Rudrapur, Distt. Udham Singh Nagar reserves the right to reject any or all tenders without assigning any reasons thereof. | Agreed |
| 24 | | QUOTATIONS NOT IN ACCORDANCE WITH THE ABOVE INSTRUCTIONS AND CONDITIONS MAY BE DISQUALIFIED. | Agreed |
| 25 | Submission of tender | Quotation must be enclosed in a sealed cover superscribed tender enquiry number & due date and addressed To, Dy. General Manager(MM/CS) Bharat Heavy Electricals Limited Component Fabrication Plant Rudrapur, Distt- Udham Singh Nagar (Uttarakhand) Pin.: 263153 Telephone No. : 05944-257221 | Agreed |

For & On behalf of the Bidder/Contractor
(Office Seal)

Singh
एस.बी. जायसवाल S.B. Jaiswal
अभि. (संयोजी प्रबंधन) Engg. (Met. Mang.)
की. सं. ई. एल.-रुद्रपुर BHEL-Rudrapur
भारत-उत्तरांचल-263153 Uttarakhand-263153

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Unpriced / Price Bid Format

Silver Plating on Al. busduct items as follows:

| Sl. No. | Material Description | Qty. (Sq. cm) | Landed Rate (Rs. / Sq. cm) |
|---------|--|------------------|-------------------------------|
| (A) | (B) | (C) | (D) |
| 1 | Silver Plating on Al. splice plates/ Al. Flat/ Al. Flexible including handling, polishing, buffing on items on F.O.R. BHEL-Rudrapur basis.(Jobs shall be lifted from BHEL-Rudrapur and shall be delivered back to BHEL-Rudrapur) The silver plating shall be 13-15 microns. Silver plating shall be done as per drg. No.45410001025 and as per product standard-SG15600 REV.03 & QAP. | 75 Lacs | |
| 2 | Silver Plating on Al. conductor/ Palm/Blanking plate including handling, polishing, buffing on items on Ex-works basis. The silver plating shall be 13-15 microns. Silver plating shall be done as per drg. No.45410001025 and as per product standard-SG15600 REV.03 & QAP. | 75 Lacs | |

Important Note:-

- i) **PV Clause:** Rates should be subject to Price Variation Clause (PVC) at the base price of Silver (99.9% purity) @ Rs. 37120/- per Kg. As per Mumbai Bullion market for the month of Dec.'2014.
For any change in this rate, the silver closing rate of Mumbai Bullion market on the 1st working day of the calendar month as published in the next day's edition of "The Economics Times" or "The Financial Express" shall be effective for supplies till the end of that month in which the plated components is to be supplied to BHEL/BHEL's fabricators.
- ii) **Silver Price Base:** Rs. 37120 per Kg.
PVC Ratio: 1: 0.7 (One is to zero point seven)
- iii) While quoting rates against column "D", bidder to ensure that they have gone through all Terms & Conditions of the tender enquiry and necessary impact of the same was taken while quoting rate in column "D".
- iv) Any applicable Taxes/Duties will be borne by bidder and should be included in Landed rate- Column-D. BHEL will not be liable to pay any reimbursement / dues on account of this.

**For & On behalf of the Bidder/ Contractor
(Office Seal)**

S.B. Jaiswal

एस० बी० जायसवाल S.B. Jaiswal
अधि. (सामग्री प्रबंधन) Engg (Mat. Mang.)
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1/4 14.08.2003

SHARATH HEAVY ELECTRICALS LIMITED, JHANSI

| COMPONENT AND OPERATION | CHARACTERISTICS | CLASS | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY | REVISIONS | |
|--|--|---|---|---|---|--|------------------------|--|--|
| 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| <p>B.H.E.L. QP/BD/164, 162 Rev.02 Date 16.07.2003 Page 1 of 4</p> <p>STANDARD SUB-VENDOR QUALITY PLAN FOR Electro Plating of Silver on Aluminium and it's Alloys</p> | <p>SUB-VENDOR'S / VENDOR'S / CONTRACTOR'S WORKS</p> | <p>MATERIAL INSPECTION / IN PROCESS INSPECTION / FINAL INSPECTION</p> | <p>AGENCY</p> | <p>REVISIONS</p> | | | | | |
| <p>A Composition And maintenance of Bath Solution</p> | <p>1 Alkaline degreasing solution 2 Chromic sulphuric acid pickling solution 3 De oxidizing solution 4 Zincate solution 5 Copper plating solution 6 Potassium Cyanide dip solution 7 Silver strike solution 8 Silver plating solution 9 Brighter addition 10 Anti tarnishing solution</p> | <p>B B B B B B B B B B</p> | <p>1 Sample to be taken from bath 2 Sample 3 Sample 4 Sample 5 Sample 6 Sample 7 Sample 8 Sample 9 Sample 10 Sample 11 Sample</p> | <p>SG: 15600 Cl. 6.1 Cl. 6.2 Cl. 6.4 Cl. 6.5 Cl. 6.6 Cl. 6.7 Cl. 6.8 Cl. 6.9 Cl. 7.9 Cl. 6.10</p> | <p>SG: 15500 Cl. 6.1 Cl. 6.2 Cl. 6.4 Cl. 6.5 Cl. 6.6 Cl. 6.7 Cl. 6.8 Cl. 6.9 Cl. 7.9 Cl. 6.10</p> | <p>Sub vendor Check list / Formats / Records</p> | <p>Sub vendor</p> | <p>Review of records by BHEL (periodic surveillance by BHEL Inspector)</p> | |
| | | | | | | | <p>CONTROLLED COPY</p> | | |

CONTROLLED COPY



2/14

PRABHAT WIRE ELECTRICALS LIMITED

| B.E.L. QP.No. 09/BD/1104 | STANDARD-SUB-VENDOR QUALITY-PLAN-FOR Electro-Plating of Silver On Aluminium and its Alloys | MATERIAL INSPECTION / PROCESS INSPECTION / FINAL INSPECTION | SUB-VENDOR'S / VENDOR'S / CONTRACTOR'S WORKS | GP.No. 09/BD/1104 REV.02 Date 16.07.2003 Page 4 of 4 | | | | |
|---|---|---|--|---|--|--------------------------------|------------|------------------|
| COMPONENT AND OPERATION | CHARACTERISTICS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT | ACCEPTANCE CRITERIA | FORMAT OF RECORD | AGENCY | REMARKS |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| F Protection coating for silver plating | a) Application of protective coating a) Drying b) Packing c) Removal of packing & protective coating | B D B B | 100% 100% 100% 100% | BD.15012 P CL.1.0 CL.2.0 CL.3.0 CL.4.0 | BD.15012 P CL.1.0 CL.2.0 CL.3.0 CL.4.0 | Sub vendor Checklist / Formals | Sub vendor | Review of Record |

CONTROLLER (CP)

LEGEND :- A :- Critical, I :- Inspection, B :- Major, TC :- Test Certificate, T :- Testing
 OS :- Observation sheet, C :- Minor, V :- Visual, Drg :- Drawing

Prepared by *(Signature)*
 Approved by *(Signature)*
 (P. JAIN)
 DM (CP)

COPIES OF THIS DOCUMENT

(Signature)

“Public Procurement Policy for MSEs Order 2012”

Tender Enquiry No. _____ **dated** _____

In line with order dated 23-03-2012 of Ministry of Micro, Small and Medium Enterprises, New Delhi following provisions shall apply to this Tender Enquiry:

1. CFP, Rudrapur has set an annual goal of procurement from Micro and Small Enterprises from the financial year 2012-13 and onwards, with the objective of achieving an overall procurement of minimum of 20%, of total annual purchases of products produced and services rendered by Micro and Small Enterprises in a period of 3 years.
2. Out of 20% target of annual procurement from Micro & Small Enterprises, a sub target of 20% (i.e. 4% out of 20%) is earmarked for procurement from Micro & Small Enterprises owned by the Scheduled Caste or the Scheduled Tribe entrepreneurs. In the event of failure of such Micro & Small Enterprises to participate in the tender process or meet tender requirements or L1 price, 4% sub-target for procurement earmarked for Micro and Small Enterprises owned by Scheduled Caste & Scheduled Tribe entrepreneurs shall be met from other Micro & Small Enterprises.
3. In tender, participating Micro and Small Enterprises quoting price within price band of L1+15% shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a Micro and Small Enterprises and such Micro & Small Enterprises shall be allowed to supply up to 20% of total tendered quantity. In case of more than 1 such Micro & Small Enterprise, the supply shall be shared proportionately (to tendered quantity).
4. Tender cost is FREE for Micro & Small Enterprises.
5. Micro & Small Enterprises are exempt from paying Earnest Money.

Note:

- (a) All Micro & Small Enterprises and those Micro & Small Enterprises which are owned by the Scheduled Caste or the Scheduled Tribe entrepreneurs are required to submit LATEST & VALID CERTIFICATES for availing the benefits enumerated in “Public Procurement Policy for MSEs Order 2012”.
- (b) Out of the 358 items reserved for exclusive purchase from Micro & Small Enterprises, the following items are procured by BHEL, CFP, Rudrapur, at present, from Industrial Entrepreneurs:

| | |
|---|---|
| <ol style="list-style-type: none"> a. Bolts & Nuts b. Boots & Shoes of all types including canvas shoes c. Conduit pipes d. Cotton absorbent e. Crates wooden & plastic f. Domestic Electric appliances as per BIS specifications g. Domestic (House Wiring) P.V.C Cables and Wires (Aluminium) conforming to the prescribed | <ol style="list-style-type: none"> h. Guntape i. Hand gloves of all types j. Hand tools of all types k. Lightning Arrester up to 22 kV l. Measuring tapes & Sticks m. Metal clad switches up to 30 Amps. n. PVC pipes up to 110 mm o. Screws of all types including High Tensile. |
|---|---|

For and on behalf of BHEL, CFP, Rudrapur

S. B. Jaiswal

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 तेलुगु-247111BHEL-Rudrapur-247111

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PROCEDURE FOR SILVER/TIN PLATING AND COATING PROTECTION

INTRODUCTION:

This standard covers the procedure for Silver Plating / Tin coating protection on Aluminium / Copper material.

PROCEDURE:

After clearance from inspecting agency, surface of the plated portion to be cleaned by using cotton cloth to remove dust, loose particles etc.

PACKING:

1. Plated surface should be suitably covered with sulphur free adhesive sheet/tape/paper.
2. Sulphur free adhesive sheet/tape/paper shall be covered with cotton tape for providing cushion.
3. Cotton tape wrapped surface shall be covered with bubble sheet in double layer to avoid ingress of moisture and for providing cushion to plated surface (Fig-3A & 3B).
4. Edges of plated palms shall be covered with hard foam to avoid damage to edges during handling (Fig-4A & 4B).
5. Packed components shall be stored under covered shed.
6. Before dispatch of Bus Duct to site, proper packing of Silver / Tin plated surface shall be ensured.
7. If any damage is noticed in the packing, it shall be re-packed by the above given process.

NOTE: SL NO. 4 is applicable for silver plated busduct palms only and not for splice plates and flexible.

REMOVAL OF PACKING:

At the time of erection of Bus Duct at site, all the packing must be removed from plated surface.

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सससुवओ. ३००१०० Udaipur-333153

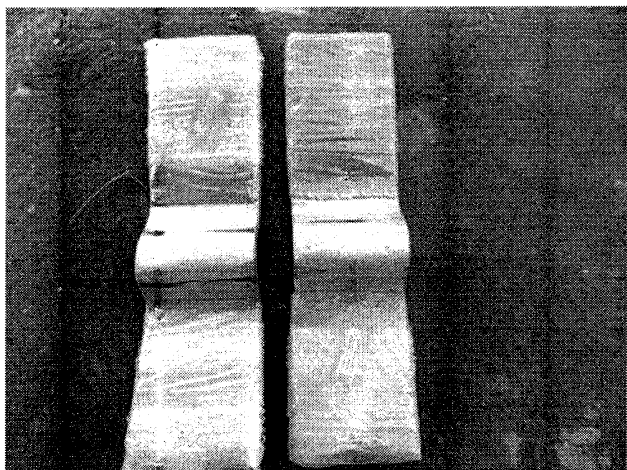


FIG-3A

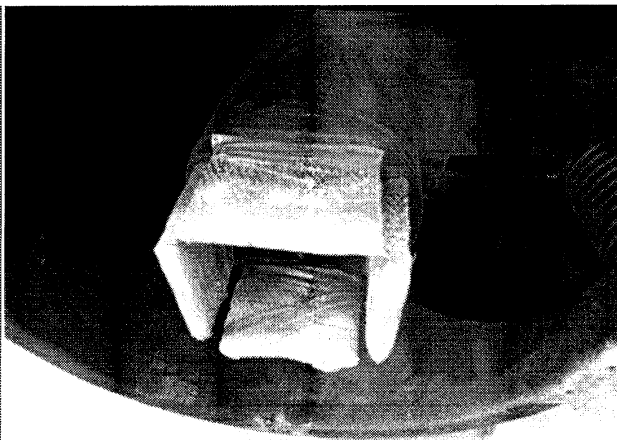


FIG-3B

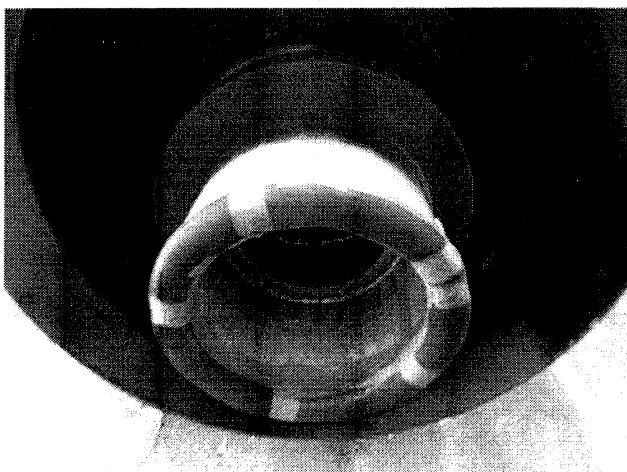


FIG-4A

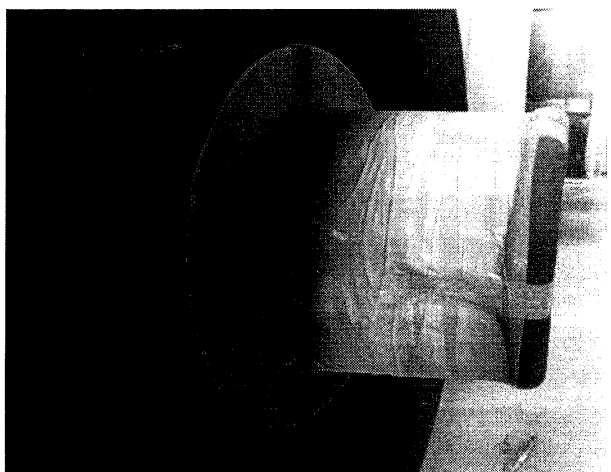


FIG-4B

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ELECTROPLATING OF SILVER ON ALUMINIUM AND ITS ALLOYS

- 1. GENERAL:** This standard details the process for plating silver on aluminum and its alloys. It covers surface preparation and modified zincate treatment required prior to electroplating silver with a copper under-coat on aluminium surfaces both in the wrought and cast forms normally used in electrical industry.
- 2. APPLICATION:** Used for Bus Bars, Bus Duct Conductors, Bus Duct Flexible, Link plates, packers, Top and Bottom flanges of Switchgear equipments etc.
- 3. COMPLIANCE:** This specification has reference to following WITH NATIONAL STANDARDS
- IS 2450 : 1963 - Recommended practice for plating on Reaffirmed 1992 Aluminium and its alloys.
- IS 3203 : 1982 - Method of testing local thickness of Reaffirmed 1992 electroplated coatings.
- IS 1771 : 1986 - Electroplated coatings of Silver and Reaffirmed 1991 Silver Alloys for general engineering purposes.
- IS 6012 : 1992 - Method of coating thickness by eddy current.

4. MATERIALS:

- 4.1 Trichloroethylene -(Technical) : AA 56706/IS: 245 Type 2
- 4.2 Chromium Trioxide(ELectroplating Grade) : AA 54205/ IS: 330
- 4.3 Sulphuric Acid -(Technical) : AA 54101/ IS: 266
- 4.4 Nitric Acid - (Technical) : AA 54102/ IS: 264

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| | | | | | | |
|-------|----------|---------------|--|------------|--------|--------|
| REV. | 03 | PRINTS TO :- | | APPROVED - | | |
| ALTD. | AKI | SWM(P) QCX | | RKS | | |
| APPD. | RKS | | | PREPARED | ISSUED | DATE |
| DATE. | 24.12.98 | | | MAS | RKJ | 7.1.95 |

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- 4.5 Caustic Soda -(Technical) : AA 54201/IS: 252
- 4.6 Zinc oxide -(Technical) : IS: 1880
- 4.7 Rochelle salt(Technical) : IS: 4846
(sodium -potassium Tartarate)
- 4.8 Ferric chloride -(Technical) : IS: 711
(FeCl₃.12H₂O)
- 4.9 Hydrofluoric Acid (40% purity)(Tech.A): IS: 10332
- 4.9.1 Acitek 707 : M/s Artek Surfing Chemicals Bombay
- 4.10 Coppele 160 (Rochelle : M/s platewel processes &
Copper salt) chemicals Ltd, Vadodara
- 4.11 Rochelle Copper salt : M/s Grauer & weil (I) Ltd, Bombay
- 4.12 Sodium Cyanide - : IS: 6358/AA 55610
- 4.13 Copper Anode (99.9% pure) - : IS: 2603
Oval shape preferred.
- 4.14 Aludegreaser : M/s Srinivasa Industrial
Chemicals, Bangalore
- 4.14.1 Cleaner S-21 : M/s Platewel Processes &
Chemical Ltd, Vadodara
- 4.15 Deoxidiser : M/s Srinivasa Industrial
Chemicals Ltd Bangalore
- 4.16 Alzincate : -do-
- 4.17 Silvernix' Bright silver salt : M/s Grauer & weil
(I) Ltd. Bombay.
- 4.17.1 Argomax Bright Silver Salt : M/S Artek surfing
Chemicals Ltd Bombay
- 4.18 Silver potassium cyanide (54% Silver) : I.S.6267:90
- 4.19 Argomax Strike Silver Salt : M/s Artek Surfing Chemicals LTD Bombay
- 4.19.1 Strike Silver Salt : M/S Grauer and Weil (I) Ltd Bombay
- 4.19.2 Strik Sil 610 Salt : M/S Platewel processes and
Chemical Ltd Vadodara

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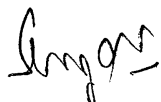
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- 4.20 Silvernix' Make-up Brightener : M/s Grauer & weil (I) Ltd Bombay
- 4.21 Silvernix' standard Brightener : M/s Grauer & weil (I) Ltd Bombay
- 4.22 Silchrome : M/s Grauer & weil (I) Ltd Bombay
- 4.23 Alzincate D : -do-
- 4.24 Potassium Cyanide : IS: 6358/AA 55609
- 4.25 Silver Anode : IS: 1959
- 4.26 Stainless Steel Anode : IS:6911, Gr.07 Cr18, Ni9
- 4.27 Stopping off Lacquer : M/s Shalimar paints, Bombay
(Resistant to acid, OR
alkali, cyanide and heat) I.E.L. Ltd, Calcutta
- 4.27.1 Grey Masking compound : M/s Phiroz Sethna Bombay
- 4.28 Activated carbon powder : M/s Grauer & weil
(I) Ltd. Bombay
or
M/s C.M.P. Ltd
Bombay
or
M/s Sharabhai M.
Chemicals, Baroda.
- 4.29 Ammonium Biflourede : IS : 13119

5. EQUIPMENT

- 5.1 Vapour Degreasing plant : Any standard plant
for the purpose.

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- 5.2 Alkaline Degreasing Tank : Mild steel Tank fitted with steam coils or Electrical Heater for heating the tank solution.
- 5.3 Acid cleaning Tank
- 5.3.1 For chromic-sulphuric Acid Soln : Lead & PVC / FRP lined mild steel Tank fitted with heating arrangements.
- 5.3.2 For Nitric-Hydrofluoric Acid Solution : PVC/PVC lined mild steel tank.
- 5.3.3 For Nitric Acid solution : PVC / FRP Rubber lined mild steel Tank
- 5.3.4 For Deoxidiser solutions : -do-
- 5.4 Zincate Treatment Tank : Mild steel tank
- 5.5 Rinsing Tanks
- 5.5.1 For Rinsing After Alkali Degreasing/Electroplating : Mild steel tank
- 5.5.2 For Rinsing After Acid cleaning : PVC/PVC lined mild steel tank
- 5.6 Copper plating Tank
PVC or Rubber lined mild steel tank or plain mild steel tank
- 5.7 Potassium Cyanide dip tank : Mild steel tank
- 5.8 Silver strike tank : FRP / PVC / Rubber lined mild steel tank
- 5.9 Silver plating tank : **FRP** / PVC / Rubber lined mild steel tank
- 5.10 Swilling tanks : PVC / **Rubber** lined mild steel tanks
- 5.11 Anti-tarnishing treatment Tank : PVC/Rubber lined mild steel Tank
- 5.12 Portable filter pump : Any suitable filtration pump.

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6. COMPOSITION/PREPARATION OF SOLUTIONS & OPERATING CONDITIONS

6.1 Alkaline Degreasing solution

Cleaner S-21 (clause 4.14.1) : 35 to 50 grams/litre

Water : To make up the volume

Temperature : 90 to 102 deg. C

Immersion time : 5 to 10 minutes
OR as required

OR
Alu-degreaser (Clause. 4.14) : 200 to 250 ml/litre

Water :

Temperature : 50-60 deg. C

Immersion time : 1 to 3 minutes
OR as required

6.1.1 The tank shall be filled with clean cold water to about 2/3rd of its capacity and then the necessary quantities of S-21 clearer OR Aludegreaser shall be added to the bath with stirring. When the chemicals are dissolved and properly mixed, the solution shall be brought to the operating level by adding more water, and heated to the operating temperature.

6.2 Chromic-Sulphuric Acid pickling solution

Chromic Acid (Clause.4.2) - 20 to 30 gm/litre

Sulphuric Acid (Clause.4.3) - 140 to 150 gm/litre

Water - To make up the volume

Temperature deg. C - 60-70

Immersion time - 2 to 3 minutes OR as required

6.2.1 The tank shall be filled with clean cold water to about 2/3rd of its capacity and then the necessary quantity of sulphuric acid shall be poured into the bath with constant stirring. When the acid is mixed then the chromic acid shall be added to the bath and after proper mixing, the the solution shall be brought to the operating level by adding more water, and then shall be heated to the operating temperature.



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6.3 Nitric - Hydrofluoric Acid pickling solution

Nitric Acid (Clause. 4.4) - 750 ml/litre

Hydrofluoric Acid (Clause. 4.9) - 250 ml/litre

Temperature - Shop temperature

Immersion time - 2 to 5 minutes OR as required

OR

Nitric acid (clause 4.4) - 700 ml/litre

Acitek 707 (clause 4.9.1) - 60 to 120 gram/litre

Temperature - Shop temperature

Time - 2 to 3 minutes OR as required

OR

Nitric acid (clause 4.4) - 700 to 750 ml/litre

Ammonium Bifluoride (clause 4.32) - 100 to 120 grams/litre

Temperature - Shop temperature

Time - 10 to 20 Seconds OR as required

6.3.1 The tank, shall be first filled with the required quantity of concentrated nitric acid and then the necessary quantity of hydrofluoric acid OR Acitek 707 (clause. 4.9.1) OR Ammonium Bifluoride (clause. 4.33) shall be mixed in it with constant stirring.

6.4 De-oxidizing Solution (Solution A OR B may be used)

Solution - A

Nitric Acid (Clause. 4.4) 500 to 750 ml/litre

Water - To make up the volume

Temperature - Shop temperature

Immersion Time - 15 to 30 seconds OR as required

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Solution - B

Deoxidiser (Clause. 4.15) - 2 parts

Water - 1 part

Temperature - Shop temperature.

Time of immersion - 30 to 60 secs OR as required

6.4.1 The tank shall be filled with clean cold water to about 1/3rd of its capacity. Then the necessary quantity of nitric acid or Deoxidiser as required shall be added to the tank with stirring and the solution shall be brought to the operating level by adding more water.

Note: Two Nos. of solution - A Bath or B Bath shall be prepared.

6.5 Zincate solution

6.5.1 composition and operating conditions
any one of three composition and operating condition as detailed below shall be used

Composition I Composition II Composition III

Caustic soda 300 to 500 - -
(Clause.4.5) grams/litre

Zinc oxide 100 grams/litre - -
(Clause.4.6)

Rochelle salt 10 grams/litre - -
(Clause.4.7)

Ferric chloride 1 gram/litre - -
(Clause.4.8)

- Alzincate Alzincate D
(M/s Srinivasa) (M/s Grauer
as supplied & weil)
as supplied

Water To make up - -
the volume

Temperature Shop Shop Shop
temperature. temperature temperature

Immersion 1 to 3 . 15 to 60 15 to 60
time minutes OR seconds
or as required as required OR
as required

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6.5.2 For Composition I

The tank shall be filled with about 1/4th of its working capacity with clean water and then required quantity of Zinc oxide added with stirring so as to make a slurry of it.

Now tank again filled with clean water to 1/4th of its working capacity and required quantity of Sodium Hydroxide gradually added with stirring. Stir till Sodium Hydroxide is dissolved completely.

For quick dissolution of Chemicals Rochelle salt (Sodium-potassium tartarate) and Ferric Chloride in the required quantity shall be separately dissolved in water and then added in main bath.

The contents shall be thoroughly mixed and brought to operating level by adding more water.

For Composition II & III

The bath shall be brought to the operating level by Alzincate itself. No dilution is required.

6.5.3. In case, any air pockets/ blister is observed after plating then the zincate solution should be sent to the laboratory for chemical analysis and necessary replenishment shall be made on the basis of the test result.

6.6 Copper plating solution

6.6.1 Composition & Operating conditions

The electrolyte shall be made according to any one of the following composition

| | Composition-I (M/s G & W) | Composition-II (M/s Platewel) |
|--|------------------------------|----------------------------------|
| Coppele 160 salt (g/l) (Clause 4.10) | - | 150 |
| Rochelle Copper salt (g/l) (clause. 4.11) | 150 | - |
| Water | To make up the volume | |
| Temperature | Shop Temperature. | Shop Temperature. |
| Current density A/sq.ft. A/sq.dm. | 1.0 to 20 0.1 to 2 | 1.0 to 20 0.1 to 2 |
| Voltage V | 3 to 4.5 | 3 to 4 |
| Time | as per thickness requirement | |

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6.6.2 Preparation of Electrolyte

6.6.2.1 The tank shall be half filled with demineralised water and heated to make it warm.

6.6.2.2 The calculated amount of copper salt as per the composition in clause 6.6 shall then be gradually added to the water with stirring.

6.6.2.3 The electrolyte shall be brought upto the desired level by adding more water and subsequently stirred thoroughly.

6.7 Pottasium Cyanide Dip Solution

6.7.1 Composition and operating condition

- Potassium cyanide (Clause.4.24) : 40 to 50 gms/litre
- Water (distilled) : To make up the volume
- Operating Temperature : Shop temperature
- Time : 1 to 2 minutes OR as required

6.8 Silver strike solution

6.8.1 Composition and Operating Conditions

Any one of the three composition and operating conditions as detailed below, shall be used.

| | | | |
|--|----------------------|-----------------------|------------------------|
| | <u>Composition-I</u> | <u>Composition-II</u> | <u>Composition-III</u> |
| | (M/s G & W) | (M/s Platewel) | (M/s Artek Surferin) |

| | | | |
|--|----|----|-----|
| 'Strike' silver-salt (grams/litre) (Clause.4.19.1) | 75 | - | - |
| 'Striksil-610 Salt (Clause.4.19.2) (grams/litre) | - | 50 | - |
| Argomax Strike silver Salt (clause.4.19) | - | - | 100 |

| | | | |
|---|-------------------------|-------------------------|-------------------------|
| Water | To make up the volume | | |
| Operating Temperature | Shop temperature | Shop. temperature | Shop temperature |
| Current Density Ampere/dm ² | 0.1 to 0.2 | 0.1 to 0.2 | 0.1 to 0.2 |
| Voltage(volt) | 0.75 to 1.5 | 2 to 4 | 0.5 to 1.0 |
| Treatment time(seconds) | 30 to 45 OR as required | 30 to 45 OR as required | 30 to 60 OR as required |

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| | Composition-I (M/s G & W) | Composition-II (M/s Platewel) | Composition-III (M/s Artek Surferin) |
|-------|------------------------------|----------------------------------|---|
| Anode | Silver/Stain- less Steel | Silver/Stainless Steel | Silver/ Stainless Steel |

6.8.2 Preparation of strike solution

6.8.2.1 The tank shall be half filled with D.M. water. The required amount of salt shall be added with stirring.

6.8.2.2 After complete dissolution, the solution shall be brought upto the working level by adding water.

6.8.2.3 Analysis of Electrolyte

The Silver metal content after initial make up, analysed and shall be minimum

2 grams/Litre for composition II (clause 6.8.1)

3 grams/Litre for composition I and III (clause 6.8.1)

6.9 Silver plating solution

6.9.1 composition and operating conditions

Any one of the two composition and operating conditions as detailed below, shall be used.

| | Composition-I (M/S G & W) | Composition-II (M/S Artek surfín) |
|---|------------------------------|--------------------------------------|
| 'Silvernix' Bright silver Salt (gms/litre)(Clause.4.17) | 200 | - |
| Argomax Bright Silver Salt (clause 4.17.1) | - | 200 |
| Silvernix Makeup Brightner (ml/L) (clause. 4.20) | 30 | 30 |
| Water | - To make up the volume - | |
| Operating Temperature : | Shop temperature | Shop temperature |
| Anode | Silver | Silver |
| Anode/Cathode Ratio | 1:1 | 1:1 |
| Current Density : | | |
| Ampere/sq.dm | 0.5 to 0.8 | 0.5 to 0.8 |
| Voltage (volt) | 1 to 1.5 | 1 to 1.5 |

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Composition-I Composition-II
(M/S G & W) (M/S Artek surfín)

pH of solution 12.0 to 12.5 12.2 to 12.5

Agitation(Optional) - Cathode Rod Movement -

Time - as per thickness requirement -

6.9.2 Preparation of Electrolyte for Silver plating

6.9.2.1 The tank shall be filled with luke warm demineralised water to 1/3 to 1/2 of the required volume and calculated amount of salt as per clause 6.9.1 shall be added with stirring.

6.9.2.2 After complete dissolution Activated carbon powder (clause 4.28) shall be added at the rate of 2 to 3 grams per litre of electrolyte and stirred for 3 to 4 hours. The solution is allowed to settle over night. Filter the solution.

6.9.2.3 After filtration the calculated amount of Make up Brighter (as per clause 4.20) shall be added, solution stirred thoroughly and made up to working volume by demineralised water.

6.9.3.0 Analysis of Electrolyte

6.9.3.1 The electrdyte, as prepared above shall be analysed after initial make up and subsequently at suitable intervals. The silver Metal content after initial make up shall be Minimum 30 grams / litre.

6.10 Anti-tarnishing solution

6.10.1 Composition and operating condition:

Silchrome (clause.4.22) - 200 to 250 ml/litre

Water - To make up the volume -

Operating Temperature Shop temperature.

Current Density

Ampere/ sq.dm - 1 to 4.5

Voltage (volt) - 3 to 7

pH of solution - 8 to 9

Treatment Time(minutes) - 2 to 5

Anode - Stainless steel

Anode-Cathode ratio - 1:1

6.10.2 Preparation of Anti-tarnishing solution

6.10.2.1 The tank shall be half filled with water.

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6.10.2.2 The required amount of salts as given in clause 6.10.1 shall then be added simultaneously with stirring.

6.10.2.3 After complete dissolution, the solution shall be brought upto the working level by adding water and subsequently stirred thoroughly.

7. MAINTENANCES OF BATH SOLUTION / BRIGHTER

7.0 The solutions shall be analysed after initial makeup and subsequently at suitable intervals. The concentration of bath solutions shall be maintained as given below.

7.1 Alkaline degreasing solution (clause. 6.1)
Cleaner S-21 Pointage 40 to 60

Aluo-degreaser Pointage 30 to 50

7.2 Chromic sulphuric Acid pickling (clause. 6.2)

Chromic acid 20 to 30 gms/Litre.
Sulphuric Acid 135 to 150 ml./Litre.

7.3 Deoxidizing solution (clause.6.4)

Solution A

Strength (Nitric acid content) /grams/litre. 260 to 390
copper content - Nil

Solution B

Pointage 20 to 30
Copper content - Nil

7.4 Zincate solution (clause. 6.5)

caustic content 300 to 525 grams/litre

7.5 Copper plating solution Composition-I Composition-II
(clause.6.6)

| | | |
|----------------------------------|----------|----------|
| Copper metal grams/litre | 15 to 17 | 18 to 20 |
| Free sodium cyanide grams/ litre | 5 to 7 | 6 to 8 |
| Rochelle salt grams/litre | 30 to 50 | 40 to 50 |

7.6 Potassium cyanide dip solution (clause.6.7)

Potassium cyanide content grams/litre. 40 to 50

7.7 Silver strike solution (clause.6.8)

Silver as metal grams/litre 3 to 4
Free potassium cyanide grams/litre 90 to 130

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7.8 Silver plating solution (clause.6.9)

Silver as metal grams/litre. 40 to 45
Free potassium cyanide grams/litre. 100 to 140

7.9 Brightner addition

Silverux standard Brightner (clause 4.21)
500 to 1000 ml/1000 Ampere hour

7.10 Antitarnishing solution (clause. 6.10)

Pointage 20 to 25
PH 8 to 9

8. PROCESS:

8.1 Solvent Degreasing

The surface of the article shall be degreased by vapour degreasing OR excess grease, oil or cutting lubricants shall be removed by means of suitable solvent such as trichloroethylene and dried in air subsequently .

8.2 Alkaline Degreasing

Parts shall be immersed in the degreasing solution as mentioned in clause 6.1 till, free from any oil or grease.

8.3 Rinsing

After Alkaline degreasing, the parts shall be rinsed in clean cold running water. The surface of the article at this stage shall provide a continuous water film over it. A break in water film indicates that the surface is not clean, in which case the Alkaline degreasing (clause. 8.2) shall be repeated.

8.4 Acid Cleaning /Pickling

8.4.1 Chromic-sulphuric acid Pickling

After rinsing the parts shall be dip in the chromic-sulphuric acid pickling solution (clause 6.2) to remove the oxide film and micro-constituents present on the metal surface.

8.4.2 Rinsing

8.4.3 Nitric-Hydrofluoric acid Pickling (optional)

In case of high silicon content, the article shall be pickled in the nitric-hydrofluoric acid pickling solution. as maintained in clause 6.3 under proper hood.

8.4.4 Rinsing



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8.4.5 De-oxidizing

After pickling as mentioned either in clause 8.4.1 or 8.4.2 depending on the requirement, the parts shall be first rinsed in clean cold running water and then immersed in oxidizing solution No.1, A or B as mentioned in clause 6.4, to remove and residual smut left on the surface.

8.5 Rinsing

After de-oxidizing the parts shall be rinsed in clean cold running water. Double rinsing is preferred.

8.6 First Zincate Treatment

After rinsing the parts shall be immersed in zincate solution (clause.6.5). The articles shall be gently stirred during the treatment.

NOTE :- For high silicon content cast alloys, the treatment time shall be reduced to 5 to 10 seconds only.

8.6.1 Rinsing

After the first Zincate treatment. The parts shall be rinsed in clean running water, double rinse is required.

8.6.2 Deoxidizing Solution No 2 (Zincate removal)

After rinsing the parts shall be dipped in Deoxidising solution No 2 as mentioned in Clause. 6.4 to remove loose zincatelayer.

8.6.3 Rinsing

After deoxidising solution dip the double parts shall be rinsed in clean cold running water. Double water rinse is required.

8.6.4 Second Zincate treatment

After rinsing, the parts shall be immediately dipped in the zincate solution as mentioned in clause 6.5.

8.6.5 Water Rinsing

After second zincate treatment, the article shall be rinsed in clean running water. Two successive rinses shall be given to remove the last traces of viscous zincate solution. A dip in running water followed by a spray is more effective.

8.7 Electroplating

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8.7.1 Copper plating/Strike

After the water rinsing, a copper strike/plating shall be given on the article from the copper plating bath (clause 6.6.1)

8.7.2 Rinsing

After copper plating the parts shall be swilled in clean cold running water.

8.7.3 Cyanide Dip

After rinsing parts shall be dipped in potassium cyanide dip solution (clause. 6.7) and then without swilling shall be transferred to silver strike solution (clause. 6.8).

8.8 Silver striking

It shall be ensured that the current is on before articles are introduced into the bath. Plating shall be done until articles are completely covered with silver. Articles shall then be transferred directly to the silver plating bath without swilling.

8.9 Silver plating

It shall be ensured that current is on before articles are immersed in the silver plating bath (clause. 6.9). The articles shall be electroplated at the specified current densities for a duration which will depend on the thickness of the deposit required.

8.10 Dragout

After removal from the tank, the parts shall be rinsed in dragout tank till all the traces of plating solution are removed.

8.11 Rinsing

After removing from dragout tank the parts shall be thoroughly rinsed in clean cold running water.

8.12 Hot rinsing -

After rinsing in cold running water the parts shall be rinsed thoroughly in Hot water.

8.13 Anti-tarnishing

Parts shall be treated in antitarnishing solution as mentioned in (clause.6.10)

8.14 Rinsing

After removal from antitarnishing bath the parts shall be rinsed in clean cold running water till all the traces of antitarnishing solution are removed. Finally the parts shall be air dried.

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8.15.0 Lacquering

Surface which do not require silver plating, may be protected by chlorinated rubber based lacquer. After Acid cleaning / pickling (clause 8.4 to 8.4.3) and rinsing (clause 8.4.4)

8.15.1 After the end of the process of plating the lacquer is removed with suitable solvent e.g. trichloroethylene.

9. PRECAUTIONS :

9.1 Proper pre-treatments are essential for getting a good plating. Therefore, process parameters, whatever specified should be strictly followed.

9.2 In the plating of aluminium, racks OR wire should be made from pure aluminium or from the alloy similar to that being plated. The contact should be strong and sound.

9.3 Electrical contacts should invariably be established before putting the work in the electrolytes, so that immersion deposits formed by substitution process may not affect the adhesion of the subsequent electro-deposits.

9.4 A separate dilute nitric acid solution (Deoxidizing solution) should be used for cleaning treatment as followed in clause 8.6.2 after first zincate treatment.

9.5 If blisters are observed after silver plating, then pre-treatment cycles are to be checked and at the same time copper plating/ strike bath is to be tested.

9.6 Any chemical which may be necessary for addition, shall then be added in the bath through a filter/Perforated Bucket.

9.7 Any metal that may be deposited on any part of the bath, shall be removed immediately.

9.8 Care of Anodes

9.8.1 Ratio of anode to cathode surface shall not be less than 1.

9.8.2 Anodes shall be removed from the silver strike and silver plating vats when they are not operating, to prevent attack by the solution.

9.8.3 Stainless steel inverted 'V' shaped anode hooks only shall be used to suspend anodes from the Bus bar.

9.9 Wires used for suspending parts or electroplating and components which may accidentally drop into the vat shall be removed at once to prevent contamination by their dissolution

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9.10 Soluble organic impurities shall be removed by activated carbon treatment. Activated carbon 2 to 3 g/litre shall be added to the solution and the solution shall be thoroughly stirred for 3 to 4 hours and then filtered. This process shall be carried out in a separate bath. Alternatively, activated carbon shall be loosely packed in the filter unit of the filter pump and the solution shall be filtered through several times.

Note: 1) After each carbon treatment makeup brightener is to be added at the rate of 100 ml/1 no gram of carbon used.

2) The dragout solution shall be used for make-up of working volume of the silver plating bath whenever required.

9.12 Filtration

To get uniform results, continuous filtration of the bath shall be carried out. If continuous filtration is not possible, periodic filtration shall be done.

10. INSPECTION & QUALITY OF DEPOSITS:

10.1 Sampling

A minimum of 1% of each batch or bath load shall be taken at random for testing with a minimum of 3 samples.

10.1.1 For big components

When plated articles/components are big and can not be subjected to any of the specified tests, a test pannel of suitable size of the same basis metal shall be plated along with component under identical condition for the purpose of testing.

10.2 Condition of Surface

The plated surface shall be smooth and free from defects such as stains, blisters, exfoliations, unplated portions, nodules and cracks.

10.3 Thickness (I.S. 3203)

The minimum thickness shall be as specified on drawing OR purchase order

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10.4 Adhesion (I.S. 1771)

The flaking and blistering of Coating shall be taken as evidence of unsatisfactory adhesion.

10.5 Soldering Test

A strip of 24 S.W.G. tinned mild steel 9.5 mm wide x 75 mm length. (approx.) shall be soldered on the flat side to the plated surface. The soldering heat shall not produce blistering on the coating. The actual soldering on the component may be done on the shop floor.

10.6 Anti-tarnishing test (IS1771)

SHALL NOT SHOW BLACK OR BROWN COLOUR.

10.7 Rejection

If the sample taken does not comply with to as laid in clause 10 to 10.6 a further quantity not less than twice the number original taken, shall be subjected to the tests in which failure occurred. If this sample also fails, the whole batch shall be rejected.

11.0 Safety measures are to be followed as detailed in AA0462801.

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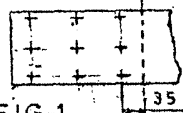
FIRST ANGLE PROJECTION

IN METRIC UNITS ARE IN (mm)

| | | | | | | |
|---------|---------------|-------------------------------------|---|--------------|-------------------------------|--|
| REV. 08 | DATE 14-03-93 | ALTERED CHECKED | REV. 07 | DATE 23-93 | ALTERED CHECKED | ADDITIONAL INFORMATION |
| REV. 09 | DATE 15-12-93 | ALT. CHD. | THICKNESS OF SILVER PLATING WAS 15 TO 18. | | | AGAINST SL. NO. 2, R. SPECIFICATION NO. WAS BHE: TSE: C P: 402 DTD. 1.8.92 |
| REV. 10 | DATE 30-11-00 | NOTE 2B MODIFIED. NOTE 2A MODIFIED. | REV. 11 | DATE 31-7-04 | ALT. CHD. NOTE 3(A) MODIFIED. | |

1. PREPARATION SURFACE FOR SILVER PLATING (BY FABRICATORS):

- A. WELDED FACES OF CONDUCTOR OR ANY DENT MARK PRESENT ARE TO BE REMOVED EITHER BY SKIM CUT/GRINDING/ EMERYING BUT DEPTH OF CUT SHALL NOT EXCEED 10 MM.
- B. DRILLED HOLES SHALL BE DEBURRED ON BOTH SIDE.
- C. DRILLED END OF THE CONDUCTOR SHALL BE FACED PERPENDICULAR TO THE AXIS OF CONDUCTOR, SILVER PLATING IS TO BE DONE 35MM FROM LAST HOLE. SEE FIG.-1.



2. SPECIAL INSTRUCTIONS FOR ELECTROPLATERS:

- A. SILVER PLATING TO BHE: STD: SG: 15600
- B. SILVER PLATING TO BE MINIMUM 10 MICRONS SILVER OR AS SPECIFIED ON CUSTOMERS SPECIFICATION WHICH EXCLUDES THICKNESS OF COPPER STRIKE AND DOUBLE ZINCATE TREATMENT. FIG.1 TO BE FOLLOWED FOR SILVER PLATING OF SURFACE IF SPECIFIED ON DRAWING.

3. PRECAUTIONS AFTER SILVER PLATING:

- A. PROTECTIVE COATING ON PLATED SURFACE: SILVER PLATED SURFACE SHOULD BE PROTECTED AS PER QP/BD/164 REV 02 S.No: F. (BY ELECTROPLATERS).
- B. WHILE DOING WELDING PRECAUTIONS TO BE TAKEN SO THAT SILVER PLATED SURFACE IS NOT DAMAGED. (BY FABRICATORS)
- C. COTTON TAPE SHOULD NOT BE REMOVED AT ANY STAGE IN THE SHOPE. THIS WILL BE REMOVED AT SITE BEFORE MAKING BOLTED JOINTS.

| | | | | | | | | | | | | | | | | | | | |
|------------|-------|-------|-------------|----|------------|-----|-------------|----|------------|----|----|----|----|------------|----|------------------|----|----|----|
| 666463 | 62153 | 52151 | 22 | 18 | 20 | 22 | 23 | 34 | 35 | 36 | 39 | 50 | 58 | 59 | 64 | 65 | 73 | 79 | 80 |
| QTY | | | DESCRIPTION | | ITEM No. | STD | DRAWING No. | | MATL. CODE | | | A | C | COMP GROUP | | UNIT WEIGHT (Kg) | | 78 | 01 |
| CARDTYPE-2 | | | 21 | 21 | CARDTYPE-1 | | | | | | | | | | | | | | |

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JHANSI

| | | | | | |
|-------|------|-------|--------------|--------------------|----------|
| DEPT. | CODE | SCALE | WEIGHT (Kg.) | REF. TO ASSY. DRG. | ITEM No. |
|-------|------|-------|--------------|--------------------|----------|

| | | | | | |
|-------|--|----------|-------|-------|----------|
| TITLE | GENERAL INSTRUCTION FOR SILVER PLATING | DRAWN | NAME | SIGN. | DATE |
| | ON ALUMINIUM CONDUCTOR & FLEXIBLE | CHECKED | N K S | sl- | 18.10.79 |
| | | APPROVED | P L V | sl- | 19.10.79 |

| | | | | | |
|---|-------------------------|--------------|------------------|----|----|
| DIMENSIONS TO BE CONTROLLED WITHIN AS LIMITS SHOWN. | CARD CODE | DRAWING No. | 15 | 16 | 17 |
| MACHINING TOLERANCE = 0.25 mm UNLESS OTHERWISE SHOWN. | | | 4 | 5 | 6 |
| NON-MACHINING TOLERANCE = | 4 5 4 1 1 0 0 0 1 0 2 5 | SHEET No. 01 | No. OF SHEETS 01 | | |

SIZE A4

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