1. Subject – Approach Note for Rod repair outside plant

2. Nature of Job – Operations

3. Scope of Work of contractor -

1. Loading of rejected rods from various locations of Rodding shop
2. Supply of hiwa, hydra and workers
3. Loading of MS Brackets and Aluminum rods
4. Minimum 2 hiwa and maximum 4 hiwa required to lift the rejected rods depend on the availability of rejected rods.
5. At any point of time, all 4 hiwa should be ready at contractor side.
6. New generation hydra required for loading and unloading of rods inside plant.
7. Rejected rods will be load in presence of Balco security and Balco employee of Rodding shop.
8. Empty jumbo bag and empty container will be loaded along with rejected rods
9. RGP will be made after loading of all material and final weighment.
10. Trip will be close based on RGP weighment.
11. Any noncompliance in SOP will result in heavy penalty which leads to termination of contract.
12. All damage cut round bar and turning chips will come back along with repair rods.
13. Cutting and welding babries (burn MS of round bar) will not allowed along with repair rods, this will be not considered in final weighment.
14. Repairing and replacement of MS bush of rod will be under the contractor scope.
15. MS bush specification will be provided by Balco.
16. Supply of Trimetallic clad and round bar is in Balco scope.
17. New clad will go outside with RGP and RGP will be close after receiving damage clads.
18. All hiwa and hydra should have valid safety parameters as per Balco norms and If found any noncompliance in any vehicle then penalty will be imposed to contractor as per Balco rules.
19. Tested and standard Chain sling will be required for loading and unloading of rods, which is under the contractor scope.
20. Tested and standard ladder will be required for climb of hiwa, which is under the contractor scope.
21. Standard rope (Polyamide/ceramide) dia-18/25mm will be required for tightening of rods.
22. Payment will be done as per given line item in PO.
23. Daily basis MIS will be required against each RGP with weighment slip proof.
24. Bank Guarantee will be required for 180 rods.
25. Contractor has sufficient numbers of machines such as bend saw, lathe, welding machine, crane or hydra, DG Set etc. should be available at workshop so that he can repair 90 to 120 rods as per requirement at plant.
26. DP test will be done in all aluminum repair rods on daily basis.
27. All DP test material will be under the contractor scope.

Activity wise Jobs to be done:

Stem Clad Repair:

For providing new Clad:-

1. Cutting of Aluminum rod joint.
2. Steel cutting of Rod from bracket.
3. Grinding of bracket surface.
4. Fixing of new clad, welding of steel to steel phase.
5. Fixing of stem rod with clad surface.
6. Grinding of bottom surface of stem rod.
7. Aluminum welding of clad with stem rod.

For repairing old Clad:-

1. Cutting of Aluminum rod joint.
2. Grinding of clad aluminum surface.
3. Grinding of bottom surface of stem rod.
4. Fixing of stem rod with clad surface.

- Aluminum welding of clad with stem rod.

Clad Fail (Transition joint failure)

- Now start chipping off stem from bracket and clad joint by pneumatic jack hammer and MS portion from gas cutting set.

- After chipping of stem rod check the stem rod whether it is straight or not. if it is straight then start champhering the welding end. Champher size 15-20 mm.

- Place the good bracket with good clad on aluminum welding stand. Then place the champhered stem rod above bracket and check right angle position it correctly so that stem should stand above bracket straight.

- Now with MIG welding machine first root run weld, then after 4-5 round fill up weld & final weld the stem rod with clad& bracket.

a) **Bracket Pin Repair & Pin grinding:**

Note: Identification of damaged pin done by the department representative for repair/change.

Identification will be done in the Rodding shop only

Damaged Rods:

Ring Neck: Diameter of stub to be checked above thimble height, if it is less than 125 mm then it is rejected

Washed stub: when one third or more (approximately) of any stub is lost in the reduction process due to bath attack and shape remaining is regular then it should be rejected

Fuse thimble: When portion of cast iron fused to the stub, and projection is more than 10 mm(approx.) , which cannot be removed by man or machine, it should be rejected.

Stub Weld Fail: Welding Crack or defects observe during visual inspection.

Bend Stub: Distance b/w two stubs should be 180 ± 10 if it is more or less rod should be re rejected.

Cutting and Welding of Bracket pin:

All involved in repair of rods were explained about benefits of achieving better alignment and quality of repair by using this template with maximum and minimum allowable misalignment limits marked on it (Snap below).

Stub pins as per marking in testing plate. If any stub pin crosses the outer ring marked (160mm) in testing plate mark it for pin cutting. Check the height of stub pin to be cut with the help of measuring tape. Write the height of round bar which is to be cut above bracket.

Now take out the rod for cutting and lay rods for pin cutting at pin cutting area and cut the marked pin from marked height, with the help of gas cutting set.

Along with gas cutting operation place the round bar over power hacksaw for cutting the pin of required stub pin height.

Now cut the round bar in power hacksaw machine. Then champher it in lathe **machine size 85 mm diameter and champer height 20 mm.**

After stub pin cutting, place the anode rod in pin welding jig and lock it. then grind the gas cutting surface. Place the champherd round bar pin at correct location for welding .ensure height of all the stub pins should be same if fitted all stub pin new (280±2mm).

Weld the champherd pin with rod .then do chipping at weld surface. After chipping clean the welded stub surface by wire brush or grinding wheel.

All new stun pin fiited length should be 280mm (420mm at the top of bracket) in repair rods and if any old pin found less than 420 then pin should be cut and new pin to be welded.

C) Pitting Repair:

Cleaning to be done in pitted area by brush and thinner
Aluminium welding to be start after cleaning in pitted area.
Grinding to be done in welding surface of stem

Aluminum Spool welding required to repair stem rods.

d). Straightening of Rod:

Straightening of bend rods to be done with Hydraulic jack assembly.

Identify location of bending in rod. I.e. Clad bend or stem bend with the help of designed tool for checking.

Place hydraulic jack at bend position and operate the levers for cylinder movement to get it straight.

e). Transportation of Rods:

Transportation of rods from Rodding shop to outside plant is done with the help of hydra and dumper. Transportation required one by one rod (five rod at a time) for loading and unloading as well, to check & identified defects / correction at sending and receiving point.

Pre dispatch Inspection of Rods:

1. Check Stub pin failure of every rod & marking will be done in damage pin.
2. Check Aluminum welding condition of every rod & if aluminum welding fail then marking will be done of aluminum fail rods.
3. Check clad welding condition of every rods, if clad welding fail then marking will be done of clad welding fail rods.
4. Check Bush condition of every rod, if bush damage then marking will be done of bush damage rods.
5. Check Pitted of every aluminum rod, if pitted will be found then marking will be done of pitted rods.
6. Straitening of every aluminum rods, if aluminum rod will be found bend then marking will be done of bend rods.

Post-Inspection of received rod after repair.

1. Stub pin welding of all new welded stub pin will be check.
2. Aluminum welding condition of every rods.
3. Clad welding condition of every rod.
4. Bush condition of every rod.
5. Pitted welding of every aluminum rod.
6. Straightening of every aluminum welded rods.

Grade for welding

- For Aluminum (organ) welding spool specification dia should 1.6mm and grade alloy 4.5-6% silicon.
- For MS welding (CO2) spool specification dia should 1.2mm.

All Cut stub pin bottom should be grinding before welding start

Current for Welding machine in Aluminium welding

- Welding amperage & voltage should be 280~300amps,20~25v
- Gas flow 20~25l/min.
- Working area and welding location cleaning by blowing air.
- Cleaning of plate/flex near weld area by thinner.

Current for Welding machine in MS welding

- Welding amperage & voltage should be 280~300amps, 25~30v.
- Gas flow 18~22 l/min.

Materials and consumables:

All materials and consumables required to perform above jobs is in the scope of contractor only.

Final product:

For comparison, below is attached snap of a good rod with all stubs perfectly aligned and with shining surfaces which has come after repair and going for casting:-

5. Penalty Clause:

1. If damage bush found in any received repair rod, Penalty will be imposed to vendor INR 1000/- per rod. Re-working of the same is in the scope of contractor only.
2.If any any defective or bend fitting of aluminium rod above of clad then penalty will be imposed to contractor Rs.-5000/-

3. If straight rod found bend then penalty will be imposed to contractor Rs 1000/- per straight Rod. Re-working of the same is in the scope of contractor only.

4. All the stub should be clean by grinder free from bath & sand before dispatch to Rodding. If found any non-compliance then penalty will be imposed to contractor Rs. 1000/- per rod.

5. If repaired rod found welding fail/ bracket pin welding missing / any kind of defects or correction not done then INR 1000/- penalty will be imposed per rod.

6. 100% availability of hydra and Hiwa at site, if found any non-availability of vehicles penalty will be imposed to contractor per day Rs. -5000/-

7. Daily rejected roods should be lifted from Rodding-2, if found any noncompliance penalty will be imposed to contractor per day Rs. -5000/-

8.If found noncompliance in SOP then first time-50000/-, Second time-100000/- and third time more or termination of contract.

6.Manpower Required – (Supervisor -2, Rigger-3,Hydra operator-2) - all should be count in outside rod repair .

7. Resources Required:

1. Hiwa (4 Nos)
2. Hydra Inside (1 Nos)
3. Gas cutting set (2 Nos)
4. Mig welding machine for stub pin welding (4 Nos)
5. Mig welding machine for Aluminum welding (2 Nos)
6. Hydraulic Jack – 50 Mt (1 Nos)

7. Grinding machine for stub grinding (2 Nos)
8. Lathe machine for champhering of stub pin (2 Nos)
9. Power hexa machine/Bend saw for stub cutting (3 Nos)
10. One Compressor
11. Chipping Gun (2 Nos)
12. Jig for aluminum fail rod repair (2 Nos)
13. Jig for Stub pin welding (6 Nos)
14. Jig for aluminum rod straitening. (1 Nos).
15. One hoist-3mt

8. RGP Procedure

RGP OPERATING PROCEDURE	
S.NO.	**Points**
1	Vendor has to place Vehicle next day after receiving the call from Engineer In charge.
2	Loading of Rods & New Round Bar will be done by vendor in presence of BALCO EIC & Security.
3	Along with Rods new round bar will be provided for repairing of rods. Diameter of new round bars will be 140 mm.
4	Weighment to be done before dispatch and Number of Rods (Bracket and Stem) to be count.
5	The material will be taken out against RGP & Purchase Order. Number of Rod (bracket and stem) and net weighment will be mentioned in RGP.
6	After repairing, vendor has to return the repaired rods, remaining round bar, damaged used stub pins and any other scrap generated during processing.
7	Weighment to be done after receiving the material and number of Rods. Welding, cutting and machining losses will be considered while closing the RGP as per sheet attached below.
8	Repaired Rods, remaining round bar and scrap to be unloaded at site.
9	Inspection will be done at site.

RGP Procedure for Clad Repair –

1. Separate RGP to be prepared for number of clads send for rod repairing outside plant.
2. Clad counting and then loading will be done in presence of security and Balco EIC

3. Number of clads to be counted and mentioned in RGP

4. After repairing, Vendor has to return the damage clads which will be counted for RGP Closing

For machining loss, calculation is attached for your reference –

Material Loss calculation per Rod Repaired		
Activity		**UOM**
Machining Loss per pin	500	gms
Taking average of 3 pins per Rod	1500	gms
Welding Loss	2.5	%
Welding loss per rod	2.3	Kg
Total expected material Loss per Rod	3.75	Kg
Approximate Loss of MS	4.2	%
Weighment Deviation	0.5	%
Total tolerance	5	%

9. Safety Norms & Conditions

- All the safety PPES required for the worker under the scope of contractor.
- Contractor follows every safety rules of BALCO.
- All vehicles full fill all safety parameter.
- New generation hydra required.
- All tool and tackles under the scope of contractor.
- All sling and compressor should be tested.