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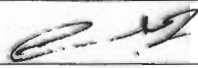
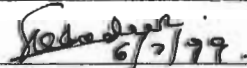
ALT	DATE	JOB No.	APPROVAL

GOVERNMENT OF INDIA
(Ministry of Railways)

**SPECIFICATION FOR
RECLAMALATION OF
GFM FORGING HAMMERS**

Issued by

**MECHANICAL DRAWING OFFICE
WHEEL & AXLE PLANT
YELAHANKA, BANGALORE-560 064
I N D I A**

		
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I. Procedure For Reclamation of GFM Forging Hammers:


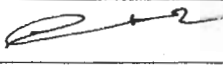
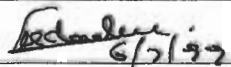
- i) Forging Hammers are made from DIN Speciation 56 NiCrMoV7 steel quenched and tempered to 34 HRC. Refer WAP Drawing No for Reclamation of Hammer WAP/SK/MA-341
- ii) The reclamation process is given below :
Entire process followed for reclamation must be documented and be made available to inspecting officials.
- iii) The inspecting official while inspecting will see complete operation on atleast one hammer of the hammer sets.

II. Electrodes To Be Used:

- * i) BO FOX SACA Electrode for a layer of 8 mm as shown in the drawing reffered above.
- * UDIMET 520 for hard facing layer to a depth of 10 mm on the groove.
- ii) General Composition and characteristics of the above are as indicated in the drawing.

III. Pre welding - stress relieving :

- i) The used forging hammers are to be stress relieved for about 10-12 Hours at 550 C in a electric furnace having features of controlling temprature and rate of Cooling.
- ii) After stress relieving hammers to be cooled down to room temprature at a rate of 15 C per Hour maximum.
The hammers must be cleaned thoroughly to metallic bright for checking of any cracks and surface condition.
- iii) Hammer bottom surface to be cleaned and ground finished to remove all high points.
- iv) Hammers should be offered for inspection and inspection report clearance be taken for furthur operation to be carried out.


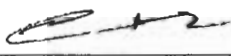
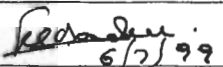
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IV. GROOVING:

- i) Grooving by milling the hammer face (Hot Contact Surface as shown in the drawing) to a minimum depth of 18 mm.
- ii) Hammers to be checked for cracks by magnetic particle test or Dye Penetrant test. All the cracks to be milled down and feathered for welding.
- iii) Clearance in writing must be obtained from WAP Representative for further processing.
- iv) Hammers is to be offered for second stage inspection and clearance certificate for further operationis to be obtained.

V WELDING OF INTERMIDATE LAYER OF BO FOX SACA OR SIMILAR :

- i) The hammers must be heated to 350 C in a temprature controlled furnace and maintain this temprature during the whole welding process. (Suitable oven and ceramic wool should be used for maintaining the temprature. Suitable device for indicating and recording Temprature and Time graph is diserable.)
- ii) The surface to be welded must be divided into 150 mm field maxmium and these are alternate welded either in one direction or in longitudinal and transfer direction. (Refer welding sketch in the drawing).
- iii) Each Welded field must be left with expansion joints of minimum 30 mm and each weld field must be hammered immediately after welding.
- iv) The welding must be of highest order from an experienced welder to avoid any over heating, Bad adhesion and interreption of the arc. No slag is allowed to remain. The entire fields must be completly cleaned to metallic bright .If any cracks are observed they must be immediately milled out and that portion is to be filled with BO FOX SACA.

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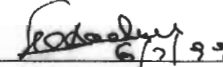
v) The hammers should be offered for third stage inspection and clearance obtained for next operation.

VI. TIG WELDING USING UDIMET 520 ELECTRODE OR SIMILAR WITH ARGON GAS :

- i) Pre heat the hammer in the furnace to 350 C and maintain this temprature during the whole welding process.
- ii) Weld UDIMET 520 on Top of the Buffer Layer by using TIG Welding process. (Refer welding sketch in the drawing)
- iii) Welding thickness should cover 10 mm of the groove and additional 3 mm for machining. Each welded layer must be hammered immediately after welding.
- iv) Hammers must be protected from atmosphere with cera wool blanket.
- v) Expansion joint should be finally welded with UDIMET 520 electrode.
- vi) Check for welding cracks and in case of any crack they must be removed to its root and welded with UDIMET 520.
- vii) The hammers should be offered for fourth stage inspection and clearance obtained for next operation.

VII. POST WELDING STRESS RELIEVING:

- i) Hammers must be heated to 550 C for about 10-12 hours and cooled at a rate of 15 degree Centrigade per hour to room temprature in a electric furnace/oven. Hardness to be obtained after welding and stress releiving is 35 to 40 HRC.
- ii) A test coupen of size 50 x 50 x 10 mm thick with weld deposit duly stress relieved must also be offered for inspection and final approval at WAP.

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VIII. MACHINING AFTER WELDING :

- i) If No cracks exists the hammers can be brought down to size by machining process e.g. Milling.
- ii) If the hard alloy shows wear a new layer can be welded with UDIMET 520 and milled again. (Note welding instructions).
- iii) Surface finish to be obtained as indicated in the drawing.
- iv) Over all height to be strictly as per drawing. In case of height being less welding with UDIMET 520 to be followed to build up the height and machined.
- v) The hammers should be offered for final inspection and after clearance are to be despatched


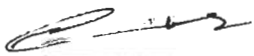
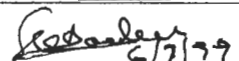
IX. Machine and cutter details.

Vertical single column milling machine with minimum parameters as follows:

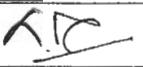
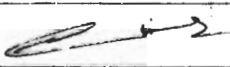
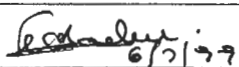
Drive Power on the spindle : - 30 Kw
 Drive Power Feed : - 6 Kw
 Cutter Head : 160 mm - 7 Blades Tungsten Carbide Tips
 Cutting Speed : 5-7 M/min
 Feed : 25mm/min
 Cooling : Drilling Emulsion.

X. Pre Qualification of the firms for reclamation of GEM Forging Hammers

- i) Essential
- ii) Electric Furnace of minimum of 500 kgs capacity with temperature controller for temperature monitoring and control for effective heating / cooling for stress relieving as well as Normalising.
- iii) Welding Transformer with current intensity adjustment to vary current intensity for welding 5mm electrode.

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- iv) TIG welding facilities with Argon Gas plant
- v) GAS / Electric Oven to Pre heat the hammers upto 350 degrees with temperature monitoring facilities.
- vi) Facilities for Magnetic Particle or Dye Penetrant Test for crack detection.
- vii) Milling machine - Vertical Single Column .
- viii) For milling welded surface with all contours and radius and to meet all dimensional requirements of the drawing.
- ix) Testing and Inspection Facilities:-
- x) Portable hardness Testing machine.
- xi) Surface Table, Height Vernier, Vernier Caliper and Dial gauges for measuring.
- xii) Technical knowhow in the field or reclamation / reconditioning of forging hammers, dies and various application of electrodes and its characteristics
- xiii) Skilled Technicians and welders able to read , understand and execute the drawings and specifications.
- xiv) Desirable:-
- xv) Universal Testing machine
- xvi) Portable Ultrasonic Flaw detector for checking internal flaws.
- xvii) Surface Testing Instrument.
- xviii) Other heat treatment facilities apart from stress relieving and Normalising.
- xix) Provision for chemical analysis.

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Instructions For Inspection of Reconditioning Of
GFM Forging Hammers.

I STAGE :

1. Please study drawing, specification and Letter of acceptance Purchase order conditions
2. Study for details of electrodes being used and confirm for general composition and charestristics of Udimet 520 and Bo Fox SACA
3. Check and record the details of stress releiving.

II STAGE :

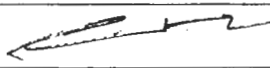
1. Check and record the depth of material removed for welding.
2. Check for any cracks either by magnetic particle or Dye Penetrant Test and record
3. Cracks must be removed in presence of inspector by proper grooving and fethering.

III STAGE :

1. Check for temprature of the hammert during welding.
2. Check for welding Bottom Layer,ensure welding as in drawing/Reclamation procedure.
3. Check for crack after welding Buffer layer ,all welded cracks must be ground and removed and welded with Bo Fox SACA.
4. Inspect Argon Arc Welding with UDIMET 520 Electrodes for TIG layer . While welding hammer to be covered with cera wool blanket.
5. Cracks if any during or after welding must be redone and welded with UDIMET 520 electrodes.
6. Check for welding expansion joints with UDIMET 520 electrodes.
7. Hammers should be allowed for stress releiving.
8. Check for Temprature and Time for heating and cooling.

IV STAGE :

1. Test coupon for each type of welding should be received by Inspector after the same is stress relieved.(The same should be tested at WAP for hardness and chemistry before giving final clerance.

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2. Check for any cracks after stress relieving, if any cracks are observed the same should be removed from its root and welded, if no cracks are observed it should be released for machining.

V STAGE :

1. Check the bottom surface for strightness and surface finish.
2. Final inspection to be done for dimension as per drawing and also copy of procedure adopted must be taken from the Firm.

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