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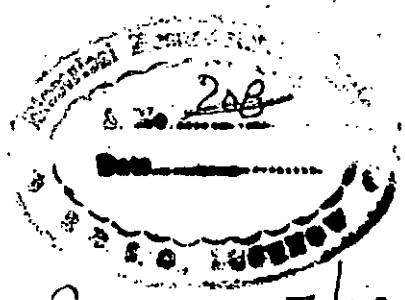

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PROCEDURE FOR WHITE METALLING (BABBITTING) OF AXLE SUSPENSION BEARINGS FOR TRACTION MOTORS USED ON ELECTRIC LOCOMOTIVES.

RDSO SPECIFICATION No. SPEC/E-7/18

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RESEARCH DESIGNS AND STANDARDS ORGANISATION
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ELECTRICAL DIRECTORATE

Specification No. SPEC/E-7/18

White Metalling (Babbitting) of Axle Suspension Bearings for Traction Motors used on Electric Locomotives.

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1. General :

This specification furnishes the detailed procedure for white metalling (Babbitting) of both used and new axle suspension bearings of traction motors. The main aim of this procedure is to obtain an adhesion as perfect as possible between steel shell and babbit (white metalic lining), which is necessary for good mechanical strength as well as good thermal conductivity of bearings.

2. For used Axle Suspension bearing only

2.1 Dematalling of shell:

Suspension bearing shells requiring rebabbitting to be kept in furnace at a temperature of 400-450°C in a tray. The white metal will melt and accumulate in tray. Take out the bearing shells from the furnace and scrap them to remove any left over metal with a suitable mild steel strip and finally clean the surface with asbestos cloth.

The following procedures should be followed for both used and new axle suspension bearings of traction motors.

3. Inspection of bearing shells:

3.1 Inspect the bearing shells for any deformations such as ovality in bore diameter, deformation in collar thickness and felt grooves etc. Ovality should not be more than 0.3 mm. The dimensions of the bearing shells should be as per drawing only. The shells not conforming to the dimensions or having any deformation and cracks detected by ringing test/ultrasonic test shall be straightway rejected.

3.2 Condition of fixtures/clamps/separating strips etc. :

All the fixtures/clamps and separating strips etc. must be kept in a cleaned condition, when not use and also should be protected against rusting by a coat of graphite painting stopping of paste may be prepared by mixing 1 Kg of Magnesium with 2.5 litre of Sodium Silicate and 1.25 litre of water. /which

3.3 Machining and cleaning of bearing shells:

3.3.1 To have good bond strength between bearing shell and white metallic lining, it is essential that shells should be thoroughly cleaned and should not have any rusted, greased/ carbonised surfaces or any other irregularities.

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3.3.2 Machining of Shells:

Machine all the surfaces of bearing shells which are to be tinned and white metalled by providing a cut of 0.05 mm to ensure that no rust/carbon/any other irregularities and foreign particles remain.

3.3.3 Degreasing and washing of shells:

After machining, bearing shells should be degreased by using white spirit/trichloroethylene/dilute hydrochloric acid. Then wash the bearing shells with hot water having a temp. of 60°-70°C.

Note: Degreased and washed surfaces of the bearing shells should not be touched by hand.

3.4 Protection of the portion of bearing shell which are to be tinned.

Apply a coat of stopping off paste of the following composition with the help of brush on the surfaces or parts of bearing shells which are to be tinned and white metalled

Composition of stopping off paste:

i)	Magnesium Oxide	1 Kg
ii)	Sodium silicate	2.5 ltr
iii)	Water	1.25 Ltr.

4. Procedure for Tinning :

4.1 Materials and plant required for tinning of bearing shell:

a) Pure Tin As per BS 2801, Grade Sn 99.85

b) Tin Bath Unit

c) Flux

Prepare the flux with following ingradients:

i)	Zinc Chloride	32.6% by weight
ii)	Amonium Chloride	2.1 % by weight
iii)	Hydrochloride Acid	6.7 % by weight
iv)	Water	58.6% by weight.

4.2 Pre-heating of bearing shells:

The bearing shell should be preheated at a temp. of 250 ± 10°C in a temperature controlled oven fitted with thermocouple and pyrometer etc. It is essential to avoid projection of tin while dipping the bearing shells in the tin bath.

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4.3 Fluxing of bearing shells

The liquid flux prepared as per clause 4.1 (C) should be applied by brush on heated bearing surfaces which are to be tinned and white metalled.

4.4 Tin bath:

Maintain the temperature of tin bath at 300 + 10°C. Use only pure tin as per BS 2801, Grade Sn 99.85. Cover the molten and heated tin having temp. of 300 + 10°C with a thin layer of molten flux prepared as per clause 4.1(c), just sufficient to cover the tin and keep the bath clean. Remove surplus flux periodically.

4.5 Tinning of bearing shells:

The preheated bearing shell with the flux brushed on shall be immersed slowly in the tin bath having temp. of 300 + 10°C for two to three times for a total period of 5-8 minutes, depending upon the size, to ensure that all the surfaces of bearing shells are tinned properly and there is no sign of blackening. At each time of removing the bearing shell from tin bath clear the dross from the surface of tin bath and remove excess tin from bearing shell surface with a fluxed brush and at the same time check the continuity of the tin layer on the bearing shell. Finally after obtaining very shine finish, keep the bearing shell for cooling. These tinned surfaces are to be protected from any damage.

5. Procedure for white metalling (Babbitting) :

5.1 White Metal

To have good bond strength, use white metal as per IS 25-1979 Grade 84. The temp. of white metal shall be maintained at 430°C-460°C and dross shall be removed from top of the molten white metal by sprinkling Ammonium Chloride powder and scrapping with an asbestos sheet.

5.2 Assembly of Bearing Shells:

During assembly of bearing shell halves, put a separator strips in between two halves, block the windows of lubricating pad with the help of some suitable plugs and then finally clamp the two halves of the bearing shells. These strips are used to ensure that both halves of the bearing shell get separated easily after white metalling.

5.3 Method of White Metalling :

There are two methods of white metalling :

i) Centrifuging method
ii) Gravity method.

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Centrifuging method is superior than gravity method and as well as provide better bond strength.

However in the absence of facilities of centrifuging method, sheds/workshops may adopt Gravity method but in the mean time facility for centrifuging method may be created.

5.4 The assembled bearing halves should be heated at 250 ± 10°C in a temperature controlled over fitted with thermocouples and pyrometer etc. Apply a coat of flux prepared as per Clause 4.1 (c) on the heated bearing surfaces. Immerse the heated bearing shell in the tin bath having temperature in between 280-300°C and keep it for such time its temperature reaches upto 280°C.

5.5 Centrifuzing method :

The heated bearing shell as per Clause 5.4 shall be removed from the bath and placed in spinning machine immediately to avoid any heat loss. Keep the guard of machine in position and run the spinning machine at set speed. Molten white metal having temperature of 430 to 460°C shall be poured through the funnel, while spinning machine is running at set speed to avoid metal being poured directly down the bearing surfaces. Care should be taken to avoid splashing of molten white metal, as far as possible. After pouring the white metal, run the spinning machine further for 2-3 minutes and spray water continuously to cool the bearing surfaces.

5.6 Gravity Method:

Heating of Core

Put the core in furnace and heat it upto temperature 700 to 800°C. The diameter of the core should be very close to the inside diameter of the fixture to get good heating. Put the tinned shell in furnace and heat upto 400°C and keep the shells in furnace further upto 1½ hr. to absorb heat. Before taking out the shell from furnace, put the heated core into the fixture so that fixture temperature may also rise upto 400°C before clamping the shells over it. Take out the bearing shells from the furnace and apply slight tin once again all over the surface along with Ammonium chloride powder and rub the surface with the brush. Apply flux and clean the surfaces of bearing shells. Clamp the shells over the fixture and seal the joint with a separator strip and put plugs in the apartures for lubricating pads. However, before pouring of white metal, the bearing shell temperature should not be less than 250°C. Pour molten white metal having temp. in between 430°C-460°C into the bearing ~~heating~~ shells upto the required level. Stir it with suitable metallic rod to release the trapped air inside the white metal. Allow it to cool down.

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6. Declamping :

The bearing shall be removed from spinning machines or fixtures. The clamps etc. shall be opened and separator strips, plugs used for blocking lubricating pad window shall be removed to separate the two halves.

7. Machining of shells:

After chipping and filing etc. the two halves of the bearing should be reclamped and mount them on lathe machines. Check its concentricity by dial guage with magnetic base and least count 0.005 mm. Do the required machining. Concentricity and ovality of bore and out side diameter should be within 0.03 mm. Bearing should not have any sharp edges. The diametrical clearance should be as per required drawing.

8. Inspection :-

Bearing should be checked as follows:

i) Visual examination.
ii) Adhesion test
iii) Ultrasonic test.

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