

## REVISION OF SPECIFICATION / STR

**Ref:** Current Spec. No. C-K202, Amendment-1- Schedule of Technical Requirements for Hanger Block of Mainline and EMU Coaches

1. RDSO is reviewing the specification/STR to cater to the latest technological developments in the field, modify clauses not relevant in the present context and making them more enabling with focus on functional requirements.
2. It is requested that your comments / suggestions with regard to improvements / modifications in specification / STR of this item may be submitted in the following format along with the justification for the changes required.

### **Part A: Basic Information**

SN	Particulars	Information
1	Name	
2	Designation	
3	Professional Qualification	
4	Organization / Firm's Name	
5	Address for Correspondence	
6	Contact No.	
7	Email ID	
8	<b>In case of Firm / Individual:</b> Manufacturing experience of item (or similar Item) on which comments are offered	
9	<b>Where relevant:</b> Whether any technical document to support suggested changes is available / enclosed for better appreciation	

### **Part B: Comments / suggestions on the specification**

SN	Clause No. of RDSO STR / Spec	Clause, as exists in RDSO STR / Spec	Clause, as it should read after incorporation of comments / suggestions in the RDSO Spec / STR	Justification for changes

#### **Comments may be sent to:**

Director/CD/Carriage  
Research Designs and Standards Organization  
Manak Nagar, Lucknow – 226011

Email: edcar.rdso@gmail.com Or jdircd@gmail.com

STR No. C - K202

MASTER COPY

INDIAN RAILWAY

Controlling Officer

Signature :

Designation Dir./SS

**SCHEDULE OF TECHNICAL REQUIREMENTS  
FOR  
HANGER BLOCK OF MAIN LINE & EMU COACHES**

(January, 2002 )

**ISSUED BY  
RESEARCH DESIGNS & STANDARDS ORGANISATION  
MANAK NAGAR, LUCKNOW - 226 001**

Price : Rs. ....

Amendment Slip No.1 of August, 2002 of STR No.C-K202 for Hanger  
Block of Main Line & EMU coaches.

Add the following at the end of Clause 2.13.

“The hardness in the wearing surface shall be between 50 to 60 RC ”

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## **SCHEDULE OF TECHNICAL REQUIREMENTS FOR HANGER BLOCK OF MAIN LINE & EMU COACHES**

### **0.0 SCOPE**

This schedule covers the technical and infrastructural requirements for the manufacture and supply of Hanger Blocks of main line and EMU coaches. The schedule has two sections i.e. Section-A & Section-B. Section-A covers the technical requirements, methods of sampling and tests for hanger block used on main line and EMU coaches. Section-B covers schedule of infrastructural requirements for manufacturing, testing facilities and quality control.

### **SECTION A**

#### **1 MATERIAL**

The material for the manufacture of hanger block shall invariably conform to class-I steel of IS:1875-92

- 1.1 Billets for forging of hanger blocks shall be manufactured from killed steel made by electric/basic oxygen/ combination of these processes or any other suitable method approved by RDSO which will meet the requirement of this schedule. Steel selected for manufacture shall be vacuum degassed and processed through secondary refining route to achieve closer control on chemical composition and freedom from inclusions. Steel shall be killed using Si or Al-Si.
- 1.2 Source of the steel shall be assessed and approved by the forging manufacturer who in turn shall obtain approval of RDSO.
- 1.3 Billets shall be reasonably free from any external or internal cracks, flakes, laps and other injurious surface imperfections so as to obtain sound forgings. The billets shall be reasonably straight.
- 1.4 The inclusion rating shall not be worse than 2.0 A,B,C,D in both thin and thick series as per IS:4163-82.
- 1.5 The ASTM grain size of the billet material shall not be coarser than 5 as per IS:4788-88.
- 1.6 Only billets of suitable size should be used for forging so as to provide a reduction ratio of 4:1 min from rolled billet to final product and satisfactory grain flow in the hanger block forging.
- 1.7 Use of flat / plates for manufacture of hanger block is strictly prohibited.

## **2 PROCESS OF MANUFACTURE**

- 2.1 Blank shall be cut on sawing / shearing machine.
- 2.2 Cut blanks shall be heated in oil fired batch type/pusher type furnace with temperature controller to control temperature +/-10 deg C.
- 2.3 Hot blanks shall be forged by drop hammers in closed dies in one operation i.e. Rolling/Mould/Finish, ensuring proper grain flow all over and at the corners. Grain flow shall follow the contour of the hanger block forging and this shall be clearly visible during macro-examination.
- 2.4 Outer fins shall be trimmed with the help of trimming die
- 2.5 After forging operation the hanger block forgings shall be allowed to cool in still air on the shop floor.
- 2.6 The forged hanger block shall be normalized in an electric or indirectly heated oil fired furnace at a temperature varying between 870° to 950°C. Forgings shall be heated slowly in the furnace to avoid distortion and soaking time at the normalizing temperature shall be at the rate of 45 minutes minimum per 25mm thickness. The hanger blocks shall be allowed to cool in still air on the shop floor after normalizing.
- 2.7 Radius of the wearing surface shall be milled ensuring that the dimensions are maintained as per relevant drawing of the hanger block.
- 2.8 Any other method like grinding or cutting of the wearing surface to generate the specified radius is strictly prohibited.
- 2.9 Machined surface and corners may be deburred, if required, by pencil grinder or hand filing.
- 2.10 Shot blasting of the hanger block forgings shall be carried out ensuring that the forging surfaces are free from scale, adherent materials, oil, grease, dust or any other type of foreign material.
- 2.11 Gas carburising : Gas carburising of the wearing surface of the hanger block forging shall be carried out up to a total case depth of 1.5mm by carburising in a temperature controlled gas carburising furnace. To ensure that only wearing surfaces of the hanger blocks are gas carburised, a suitable masking compound shall be applied on remaining surfaces of the hanger block before carburising. The masking compound must be able to effectively prevent carbon penetration on the areas where carburising is to be avoided. This aspect shall be checked on the forging after carburising by sectioning a sample piece and subjecting it to macro-examination. On

- the first test piece case depth shall be checked. When required case depth is achieved, carburising fluid quantity and the process shall be standardized and diffusion cycle so arrived at shall be followed.
- 2.12 The hardness in the non-carburised areas of the Hanger Block shall not exceed 190 BHN.
  - 2.13 Hardening : Carburised hanger block shall be heated to 930 deg C in a reducing atmosphere and soaking shall be done for minimum 2 hrs. The hanger blocks shall be thereafter be quenched in oil / water.
  - 2.14 Stress relieving of the hanger blocks shall be done by heating them at 250degree C maximum in an electric furnace having neutral / reducing atmosphere.
  - 2.15 Dimension of the hanger block shall be checked to ensure conformity to the drawing.
  - 2.16 All hanger blocks shall be given a rust preventing coating to avoid corrosion.
  - 2.17 To avoid any damage to hanger blocks due to looseness during transit, the blocks may be grouped and kept in a suitable container.

### **3 MARKING PARTICULARS**

#### 3.1 Type of Code

BG Main line coaches	-	T
BG EMU motor coaches	-	E
BG EMU trailer coaches		
MG EMU motor coaches	-	D
MG Main line coaches		
MG EMU trailer coaches	-	M

#### 3.2 Manufacturer's initials.

#### 3.3 Month and year of manufacture.

#### 3.4 The marking should be punched. The block is machined.

### **4. INSPECTION BY THE MANUFACTURER**

- 4.1 The manufacturer shall maintain test certificates issued by steel manufacturers with details of cast No., Chemical composition, steel-

making process etc. They shall also carry out the following tests on the representative sample of steel and maintain records.

- a) Chemical composition
- b) Tensile strength, yield strength and percentage elongation
- c) Bend test
- d) Macro examination for checking presence of segregation, cracks, voids etc.
- e) Inclusion rating
- f) Grain size

4.2 Stage Inspection : The manufacturer shall carry out stage inspection during manufacturing of hanger blocks and maintain records.

4.3 Finished Product Inspection by Manufacturer: -

- a) Dimensional accuracy, and  
Radius on wearing surface 100%
- b) Hardness 100%
- c) Magnaflux testing 100%
- d) Case depth – One sample per batch of 100Nos. or a part thereof.

The manufacturer shall maintain all the records of stage and final inspection and produce to the inspecting authorities as and when asked for.

## **5 INSPECTION BY INSPECTING AUTHORITY**

The inspecting authority or his representative shall satisfy himself in respect of the following before taking up the inspection of finished hanger blocks: -

- i) Manufacturing process and quality control followed by the firm is acceptable.
- ii) The raw material used conforms to correct specification and size. He may carry out random checking of test results detailed at 4.1
- iii) He shall check the records of stage and final inspection and satisfy himself by carrying out random physical checks.

5.1 Inspection of Finished Product : -

Representative samples of hanger blocks in a lot, picked up at random, shall be checked for the following. Each lot shall consist of 300 number hanger blocks or a part thereof and % of samples to be drawn are indicated below.

- a) Dimensional accuracy (10%).



- b) Surface / Sub-surface defects by magnetic Particle testing (wet method) – (10%).
- c) Hardness of the wearing surface and non-wearing surface.
- d) Case depth @ one sample per batch.
- e) Grain flow lines @ one hanger block per batch.
- f) Chemical composition of the material @ one sample per batch or part thereof. Sample should be drawn from the central part of the hanger block for spectrometric analysis.

## **6 INSPECTION AT CONSIGNEE END**

- 6.1 Railways shall carry out Audit checks on all the new hanger blocks procured by them.

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## **SECTION-B**

### **1 REQUIREMENTS**

The vendors seeking approval shall comply with all the requirements mentioned below: -

#### **1.1 GENERAL & MANUFACTURING FACILITIES**

- 1.1.1 Covered area with adequate space underneath for storage of raw materials e.g. billets, round corner squares, rounds etc. The covered area should have display board.
- 1.1.2 At least 1 no. fork lift / overhead crane / pulley block of 2 tonne capacity shall be available for material handling.
- 1.1.3 Minimum 2 Nos. power hacksaw / band saw or one number billet shearing machine to cut / shear the billets/RCS/rounds shall be available.
- 1.1.4 At least 2 No. of drop hammer of 2 t or equivalent capacity shall be available.
- 1.1.5 At least one number 400 t mechanical press for stamping/trimming shall be available.
- 1.1.6 Minimum 2 Nos. compressors of 200cfm each shall be available.
- 1.1.7 Minimum 2 Nos. of batch type oil fired or gas-fired or induction furnace of sufficient capacity should be available. The temperature range should be up to 1200 °C and the furnaces should be provided with temperature recorders and controllers. The furnace shall have arrangement of controlling the internal atmosphere to avoid undesirable scaling and decarburisation.
- 1.1.8 Maximum one number pit type electric or equivalent tempering furnace of adequate capacity should be available. The furnaces shall be equipped with automatic temperature recorders and controllers.
- 1.1.9 Facilities for gas carburising the wearing surface of the hanger block should be available.
- 1.1.10 One number oil / water-quenching tank of sufficient capacity with heat exchanger and continuous oil circulation facilities should be available.
- 1.1.11 One number shot blasting machine should be available. The shot blasting machine should have in-built facility of sieving the undersize shots.

1.1.12 Adequate machining facilities comprising of vertical milling machine, radial drilling machines, horizontal lathes of suitable size and capacities and of standard makes for making die blocks and machining the forged components should be available.

1.1.13 Adequate number of hand grinders including pencil grinders should be available.

1.1.14 CAD facility for designing and checking the dies should be available.

## **1.2 TESTING FACILITIES**

1.2.1 Chemical Lab.

1.2.1.1 Arrangement to carry out the analysis of five basic elements i.e. C, Mn, Si, S & P should be available.

The firm should also have permanent arrangement with a Govt. Approved lab or a reputed steel making company for arranging the spectro-analysis of the material.

1.2.2 Physical Testing Lab

The firm must possess a well-equipped physical lab with following facilities

- a) Universal Testing machine 20T capacity with load/deflection graph plotting arrangement.
- b) Rockwell and Brinell's hardness testing machines

1.2.3 Non-destructive testing

- a) One number magnetic particle testing machine (wet method) with ultra violet light facilities should be available. The machine shall have arrangement for both longitudinal and circular magnetisation. Magnetising current capacity shall be appropriate 1500 amps minimum.
- b) One number hydraulically operated proof load testing machine having minimum capacity of 20 should be available.

1.2.4 Other Testing Facilities

- a) Adequate facilities for preparation of test sample shall be available.
- b) Adequate numbers measuring instruments and GO & NO-GO gauges shall be available to ensure dimensional accuracies.

### **1.3 QUALITY CONTROL REQUIREMENTS**

- 1.3.1 There should be a system to ensure the traceability of the product from raw material stage to finished product stage. This system should also facilitate to identify the raw material composition from the finish product stage.
- 1.3.2 The firm must ensure that there is a QAP for the product detailing various aspects:-
- Organisational Chart
  - Flow Process Chart
  - Stage inspection details
  - Various parameters and to ensure control over them
- 1.3.3 There should be at least one full time technologist having a minimum bachelor's degree in relevant field & 5 years experience. He should be free from day-to-day production, testing and quality control responsibilities. He should be mainly responsible for development of the product, analysis of products, control over raw material, corrective action in case of difficulties in achieving the parameters.
- 1.3.4 The firm must ensure that the in-charge of the Quality Control Section is having a qualification of minimum bachelor's degree in the relevant field and has a minimum of 5 years experience. Alternatively the in-charge can be a diploma holder with a minimum of 12 years experience. He should be actively involved in day-to-day activities of quality control /stage inspection /compliance of QAP etc.
- 1.3.5 The firm should have acquired ISO-9000 series certification and the product for which an approval is sought should be broadly covered in the scope of the certification for manufacture and supply.
- 1.3.6 The quality manual of the firm for ISO-9000 should clearly indicate at any stage the control over manufacturing and testing of the said railway product.
- 1.3.7 The firm should ensure that a proper analysis is being done on monthly basis to study the rejection at various internal stages and it is documented.
- 1.3.8 The firm must ensure that all the relevant specifications, IS standards are available with them.

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