

REVISION OF SPECIFICATION / STR

Item Name: Instructions regarding material, tests and inspection of Rubber Spring Assembly used on HHP Diesel locomotive bogies.

Specification No: MP.IB.VL-05.33.08

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 the abovementioned 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.	Whether firm is registered with RDSO for the subject item. If yes, details like date of registration, current status etc. If no, firm's experience in manufacturing of subject item or similar item	
8.	Whether any technical document/Report/Study 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 it 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 following address within one month from the date of publication on rdso.indianrailways.gov.in

Joint Director/MP(VDG)
Research Designs and Standards Organization,
Manak Nagar, Lucknow – 226011

Email: sanjai.govil@gov.in

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW – 226 011**

No. SV.IB

Dated: 29.09.2022

INSTRUCTION BULLETIN No. MP.IB.VL.05.33.08 (Rev.02)

1. TITLE

Section-A of this Instruction bulletin contains to Instructions regarding material, tests and inspection of Rubber Spring Assembly used on HHP Diesel locomotive bogies.

Section-B of this Instruction bulletin contains to the Minimum Technical Requirement is to assess the manufacturing & testing capability of the vendors for Rubber Spring Assembly used in HHP Diesel locomotive bogies.

SECTION-A

2. INTRODUCTION

The rubber spring assemblies (Rubber Springs) to EMD part no. 40075328 (for WDG4, WDG4D, WDP4B & WDP4D) and 40090677 & 40090678 (for WDP4) are presently in use at the secondary stage of bogie suspension of HHP Diesel locomotives. They are subjected to static and dynamic loadings both in compressive and shear modes simultaneously during service. The maximum loading on the each rubber spring including dynamic augmentation is approximately 18 tonnes in compressive mode and 2.5 tonnes in shear mode.

Keeping in view the wide climatic variation prevailing in the country, the design of rubber spring assemblies should be such that they are capable to withstand the field operating conditions during service without physical deterioration. Also, the change in compression & shear stiffness characteristics for natural rubber should be within the specified range.

At present, these rubber springs are being procured as per the relevant EMD drawings, which specify only their outline dimensions and their stiffness at a given load. The material properties for steel plates have not been defined in these drawings. However, EMD separately specified a code for properties of rubber in accordance with ASTM D 2000. Also, various parameters which are to be kept in view during inspection of these items have not been laid down.

In view of above, a need was felt to decode material properties of rubber, define specification for metal plates and other technical requirements including relevant tests and parameters for inspection of these rubber springs to ensure their quality.

This instruction bulletin has been prepared after studying various associated ASTM standards. The additional requirements besides those mentioned in the relevant EMD drawings for rubber springs have been contained in this IB. It also lays down the inspection parameters to be ensured during procurements.

3. REFERENCE

Vide Railway Board's letter no. 2007/ M (L)/ 466/ 5 (402) dated 28.08.2007; these Rubber Spring Assemblies have been transferred to RDSO & included in RDSO vendor directory.

This IB draws reference to latest revisions of various standards and specifications given below:

Srl.	Spec Standards No.*	Descriptions
1.	ASTM D 395	Test Methods for Rubber Property - Compression Set
2.	ASTM D 412	Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
3.	ASTM D 573	Test Methods for Rubber - Deterioration in an Air Oven
4.	ASTM D 1171	Test Method for Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens)
5.	ASTM D 2137	Standard Test Methods for Rubber Property - Brittleness point of Flexible Polymer and Coated Fabrics
6.	ASTM D 2240	Test Method for Rubber Property - Durometer Hardness
7.	ISO: 3302 Part 1	Dimensional Tolerance of Solid Moulded and Extruded Rubber Products
8.	IS: 2062	Steel for General Structural Purposes - Specification
9.	IS: 2102 Part 1	General tolerance - tolerances for linear & angular dimensions without individual tolerance indications
10.	IS: 9139	Malleable Iron Shots and Grits for Use in Foundries

*or equivalent IS standards.

5. TECHNICAL CONTENTS / INSTRUCTIONS

5.1 The outline dimensions and tolerances of the rubber springs shall be as per the relevant EMD drawings. The detailed dimensions have to be recorded as per the enclosed sketch 2008-10, 2008-11 & 2008-12.

- .1 Un-toleranced dimensions of steel plates shall have tolerances as per IS: 2102 (Medium) or equivalent international standard.
- .2 Un-toleranced rubber dimensions shall have tolerances as per Table 1 of ISO: 3302, Class - M4 or equivalent international standard.

5.2 Besides, following parameters should also be ensured.

.1 Materials

• Rubber

The rubber should be natural rubber suitably compounded to conform to the requirements stipulated in this IB.

• Metal Plates

End mounting plates and the interleaves shall be of steel confirming to IS: 2062 E250 Quality 'A' or equivalent International standard.

.2 Moulding Process and Finish

- The manufacture of rubber spring assemblies shall be done by injection moulding process.
- The temperature and moulding time shall be optimized for proper curing of rubber. The optimization should be done using a Rheometer.
- The rubber shall be smooth and free from pinholes, blisters, signs of debonding and other visual flaws.
- The preparation of metal plates shall be done ensuring that:
 - a) All sharp edges and burrs are removed from the steel plates. These plates should be straightened for application.
 - b) The metal plates are chemically cleaned/ degreased before shot blasting.
 - c) The metal plates shall then be shot/ grit blasted. The shots/ grits shall be as per IS: 9139-G-M30 or equivalent international standard.
 - d) It has to be ensured that the metal surface is free from rust, moisture, metal oxide, non-oily contaminants and other foreign particles before applying primer coat.

Note: For achieving the required bond strength between metal plates and rubber, the metal plates which are ready for use, should be stored suitably before applying primer coat to avoid contamination of the surface. The process and bonding agent adopted for bonding of rubber to metal plate shall be of proven quality, Chemlok as bonding agent is recommended.

3 Tests

Following tests shall be conducted to ensure properties of rubber as per the relevant standard and shall conform to the following limits:

Srl.	Properties	Method/ Standard	Permissible Limits
1.	Tensile Strength kg/cm ² (minimum)	ASTM D 412	215
2.	Elongation at break (% minimum)	ASTM D 412	500
3.	Hardness Shore 'A'	ASTM D 2240	50±5
4.	Compression set at 70°C for 22 hours (% maximum)	ASTM D 395	25
5.	Heat Resistance Test	ASTM D 573	Para ¹
6.	Resistance to Ozone (Quality retention rating) (% min)	ASTM D 1171	85
7.	Low temperature resistance at - 40°C for 3 minutes	ASTM D 2137	Non brittle and no crack

Para¹: Heat Resistance Test

This test is to be done as per ASTM D 573 after ageing at 70°C for 70 hours. The tensile strength, elongation at break and hardness shall not vary from the value obtained before heat resistance test by more than the limits as follows:

Srl.	Properties	Permissible Limits
1.	Tensile Strength	- 25 %
2.	Elongation at break	- 25 %
3.	Hardness (Shore 'A')	+ 10

5.3 Parameters for inspection

Various parameters to be ensured during inspection of these rubber spring assemblies are enclosed as Annexure I.

5.4 Field Trial

After fitment of the component on locomotives, approval may be considered after satisfactory field performance as stipulated in MPM-8.1.1. Field performance shall be monitored as per format attached as Annexure-III

6. AGENCY FOR IMPLEMENTATION

BLW, Diesel Locomotive Sheds holding WDG4 & WDP4 locomotives and Loco Maintenance Workshops.

7. DISTRIBUTION

As per enclosed list.

(Sanjai Prakash Govil)
Joint Director / MP (VDG)
For Director General / MP

ANNEXURE-I**INSPECTION PLAN FOR RUBBER SPRING ASSEMBLY FOR HHP DIESEL LOCOMOTIVES****1. SCOPE**

This inspection plan covers the checks to be carried out by the Authorized Inspecting Agency during inspection of "RUBBER SPRING ASM (ASSEMBLY)" for HHP Diesel locomotives and on the manufacturer in reference to the Purchase Order. The rubber springs shall be subjected to inspection by the Authorized Inspecting Agency as detailed in this Inspection Plan to ascertain their quality.

2. CONTRACT DOCUMENTS

Srl.	Descriptions
1.	Purchase Order in reference
2.	Drawing(s) referred in Purchase Order
3.	Quality Assurance Plan of the firm for Rubber Spring ASM

3. DEFINITIONS

The various abbreviations used in this inspection plan and their interpretations are tabulated as follows:

Srl.	Abbreviations	Descriptions
1.	Rubber Spring	Rubber Spring ASM or Rubber Spring Assembly
2.	Firm / Manufacturer	Manufacturer on which PO in reference is placed
3.	Inspector	Authorised Representative of Inspecting Agency
4.	TC	Test Certificate
5.	IC	Inspection Certificate
6.	DP	Delivery Period
7.	PO	Purchase Order
8.	QAP	Quality Assurance Plan

4. FACILITIES FOR INSPECTION

- 4.1** The Inspector shall be permitted to carry out all the checks included in this Inspection Plan.
- 4.2** The Inspector shall have free access to the works of the manufacturer at all reasonable times. He shall be at liberty to reject any material that does not conform to the relevant drawing/ specification.
- 4.3** The manufacturer shall provide free of charge, all the facilities to the Inspector, such as labour, measuring instruments, testing facilities and necessary assistance in carrying out all the tests in accordance with this Inspection Plan. If facilities for carrying out any checks mentioned in this Inspection Plan are not available at manufacturer's works, the manufacturer shall arrange such checks elsewhere at their expense.

5. GENERAL CHECKS BY THE INSPECTOR

Before commencing the inspection, the Inspector shall ensure that:

- 5.1** The delivery period of the Purchase Order is valid.
- 5.2** Valid copies of QAP and relevant drawings as per the P.O are available.

- 5.3 Check the internal inspection records carried out at various stages of manufacture of the product by the firm's quality control department for the product being offered and confirm that the results of the internal inspection records are in order.
- 5.4 The measuring instruments, gauges, testing facilities etc are in working order and they are properly calibrated.
- 5.5 The copies of latest versions of all the reference specifications are available with the firm.
- 5.6 The observations on general checks carried out by inspecting agency shall be recorded in Format-I.

6. INSPECTION PROCEDURE

6.1 Lot Size

The lot size of rubber spring to be offered in one inspection shall be 50 nos. or full quantity if the order is for less than 50 nos.

6.2 Sample Size

Sample size for various tests indicated below shall be drawn from the lots offered for inspection by the representative of Authorized Inspecting Agency.

Srl.	Type of Test	Test Parameters	Sample Size/ Lot
1.	Non-destructive Tests	Dimensions	03 ¹
		Visual Examination	
		Load-Deflection Test	02 ¹
2.	Destructive Tests	Heat Ageing (Resistance) of Rubber Compound	02 ¹
		<ul style="list-style-type: none"> • Tensile Strength kg/cm² (minimum) • Elongation at break (% minimum) • Hardness Shore 'A' • Compression set at 70°C for 22 hours (% maximum) • Heat Resistance Test 	02 ¹
3.	Miscellaneous Tests	<ul style="list-style-type: none"> • Resistance to Ozone Test (Quality retention rating) (% minimum) • Low temperature resistance at - 40°C for 3 minutes 	² During prototype inspection and subsequently every six months

Note:

- 1 *The samples of rubber spring selected for destructive testing shall be used for conducting all the tests given under destructive testing. The test piece and test sample shall be prepared from the rubber spring during sampling, which shall be different from those selected for non-destructive testing. If the results are found acceptable, the inspecting authority shall place his seal on samples on which non-destructive testing was done, which shall be part of the delivery.*
- 2 *Resistance to Ozone Test and Low temperature resistance test should be conducted during prototype inspection and subsequently every six months as per the procedure laid down in relevant ASTMs.*

6.3 Acceptance Criteria

- .1 The material offered for inspection shall not be withdrawn during the course of inspection by the firm. Any move to withdraw the material/ interfere/ hinder with the inspection, by the firm in any way, shall render the rejection of the entire quantity of material offered for inspection.
- .2 If any sample fails in one or more criteria given in Para 6 of this IP, double the sample size shall be drawn and tested against the criteria in which the failure had occurred. If all the samples of double sampling pass the criteria, the entire quantity shall be accepted.
- .3 Failure of any sample of the double samples will, however, result in rejection of the entire offered quantity. The intimation of the failure shall also be sent to RDSO with clear remarks whether the firm is adhering to its QAP.
- .4 In case the firm is failing to adhere to its QAP and the material has also failed during inspection, the material stands rejected and further inspection of material stands withheld with the firm. A report shall be issued by the inspecting agency to RDSO for initiating action against the firm on account of its failure to abide its QAP.
- .5 In the event of rejection, the entire quantity offered for inspection shall be made unusable for Railway application in presence of the Inspecting Agency.

6.4 Stamping

The rubber spring which has been inspected and passed, shall be double stamped by the Inspecting Agency. The entire quantity of rubber spring from which the sampling has been done shall be stamped (single stamp mark) by the Inspecting Agency.

GENERAL CHECK SHEET

Sr.	Description	Observations
1.	Name of Component	
2.	Firm's Name	
3.	Date (Period) of Inspection	
4.	Contract Details	
	a. Purchase Order No. & Date	
	b. P.O placing Authority	
	c. Drawing No. as per P.O.	
	d. Inspecting Authority as per P.O.	
5.	Quantity on P.O.	
6.	Quantity offered for Inspection	
7.	Consignee	
8.	Validity of D.P. of P.O.	
9.	Remarks on internal checks carried out by the firm	
10.	Remarks on calibration of Measuring Instruments and Testing Facilities	
11.	Remarks on availability of copies of latest versions of Specifications & Standards referred	

Quality Control Manager of Firm	Authorised Representative of Agency	Inspecting Agency

MATERIAL PROPERTIES CHECK SHEET

A. Raw Material Checks

i) Rubber Compound Check

Specified Sample/ Lot Size:

Whether material conforms to Specification (Yes / No):

Raw Material	Material Specified	Observations
Rubber compound	Natural Rubber	

ii) Metal Plates Check

Specified Sample/ Lot Size:

Whether material conforms to Specification (Yes / No):

B. Physical properties of Rubber Compound

i) Tensile Strength (Minimum Specified Value: 215 kg /cm²)

Parameters	Observed Value						Remarks
	Sample 1			Sample 2			
	a	b	c	a	b	c	
Load at Break (kg)							
Tensile Strength (kg/cm ²)							
Median Value (kg/cm ²)							

ii) Elongation at Break (Specified Value: 500% Minimum)

Parameters	Observed Value						Remarks
	Sample 1			Sample 2			
	a	b	c	a	b	c	
Length at Break (mm)							
Elongation (%)							
Median Value (%)							

iii) **Hardness** (Specified Value: 50 ± 5 Shore A)

Parameters	Observed Value										Remarks
	Sample 1					Sample 2					
	a	b	c	d	e	a	b	c	d	e	
Hardness											
Median Value											

iv) **Compression set**Test Conditions:

Temperature: 70° C & Time: 22 hours (Specified Value: 25% Max)

Parameters	Observed Value						Remarks
	Sample 1			Sample 2			
	a	b	c	a	b	c	
Compression Set							
Median Value (%)							

v) **Heat Resistance Test**Test Conditions:

Temperature: 70° C & Time: 70 hours

a. **Tensile Strength** (Specified Value: Maximum permissible variation of -25%)

Parameters	Observed Value						Remarks
	Sample 1			Sample 2			
	a	b	c	a	b	c	
Load at Break (kg)							
Tensile Strength (kg/cm ²)							
Median Value (kg/cm ²)							
% Variation							

b. Elongation at Break (Specified Value: Maximum permissible variation of -25%)

Parameters	Observed Value						Remarks
	Sample 1			Sample 2			
	a	b	c	a	b	c	
Length at Break (mm)							
Elongation (%)							
Median Value (%)							
% Variation							

c. Hardness (Specified Value: Permissible variation of +10 Maximum)

Parameters	Observed Value										Remarks	
	Sample 1					Sample 2						
	a	b	c	d	e	a	b	c	d	e		
Hardness												
Median Value												
Variation in Hardness												

vi) Resistance to Ozone test:Test condition:

At 40 ±1° C temperature for 70 hours, specified value: 85% Minimum

Parameters	Observed value		Remarks
	Sample 1	Sample 2	
Quality Retention Rating			

vii) Low Temperature Resistance Test:Test condition:

Test at -40° C for 3 minutes, specified value: Non-brittle & no crack

Parameters	Observation
Visual Check	

C. Load-Deflection Test of Rubber Spring assembly for HHP Diesel locomotives**In Compression Mode: -**

The rubber spring shall be subjected to three successive loadings up to 10.2 tonnes. During the fourth cycle, the rubber spring shall be compressed with a load of 50 kg and deflection taken as 'zero' at this point. The deflection at loads of 10.2 tonnes shall be recorded with the help of dial gauge (s) / digital read out. The loading / unloading of the rubber spring shall be done sufficiently slow so as the deflection of the pads is not affected by heat. The deflection values at various loads shall be within the permissible deflection values given below.

Load (Tonnes)	Specified Deflection (mm)	Permissible Tolerance (%) on deflection	Observed Values of deflection (mm)	Remarks
10.2	12.8	± 25		

In Shear Mode: -

Two Rubber Springs coupled together shall be held suitably at a compressive load of 10.2 tonnes. The assembly then shall be subjected to shear load applied on the mounting plates of two Rubber Springs coupled together, three times successively up to 4 tonnes at a slow speed. During the fourth cycle, the deflection values in shear mode shall be recorded at loads of 2 tonnes and 4 tonnes using a dial gauge (s) / digital read out. The deflection values shall be within the limits given below:

Load in Tonnes	Specified Deflection (mm)			Permissible Tolerance (%) on deflection	Observed Values of deflection(mm)			Remarks
	WDG4, WDG4D, WDP4B WDP4D &	WDP4			WDG4	WDP4		
		Major	Minor			Major	Minor	
2.0	31	33	40	± 20				
4.0	65	68	82	± 20				

Quality Control Manager of Firm	Authorised Representative of Inspecting Agency

FORMAT -III

VISUAL & DIMENSIONAL CHECK SHEET

A. Drawing No.:

B. Lot size :

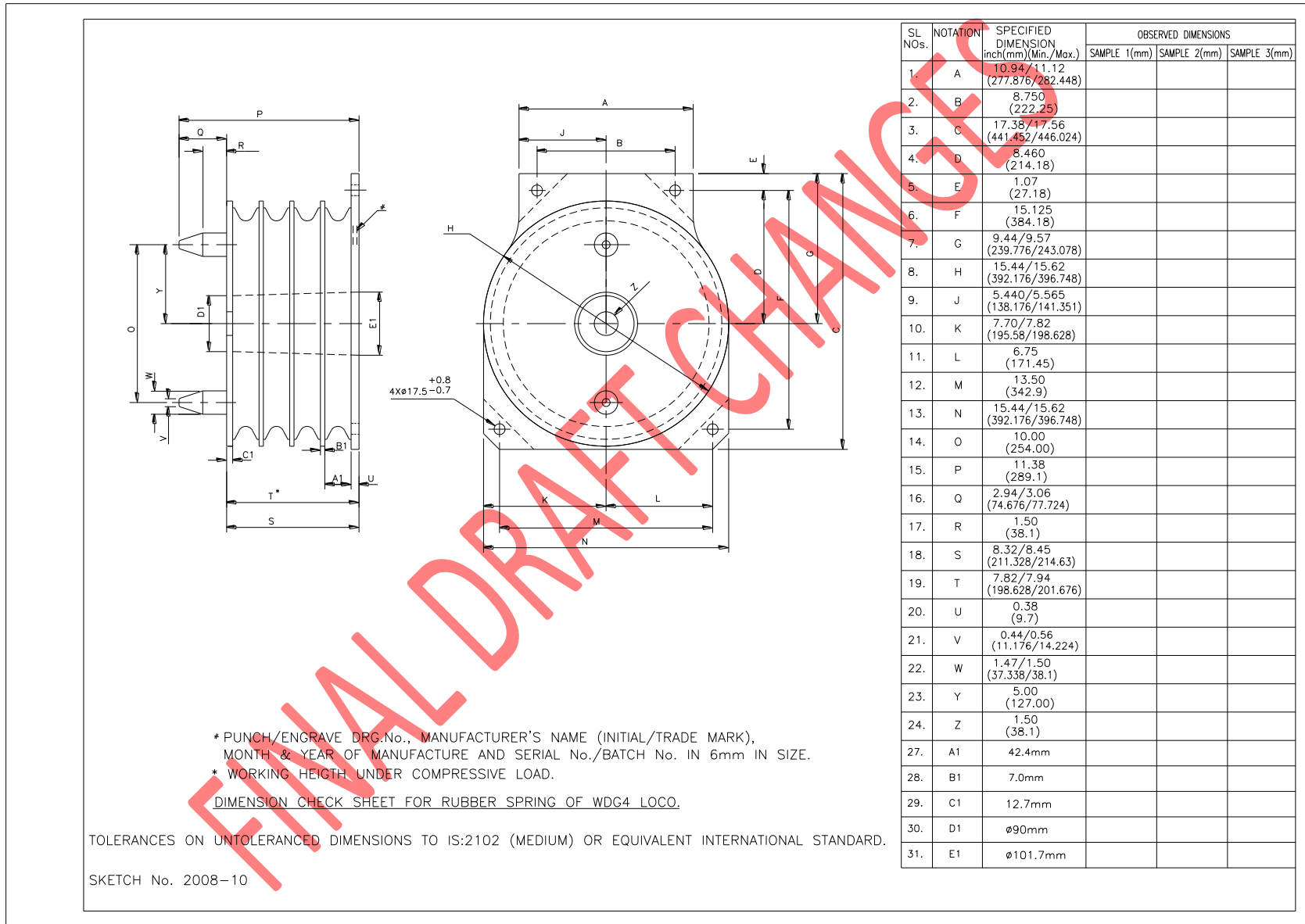
C. Visual Check:

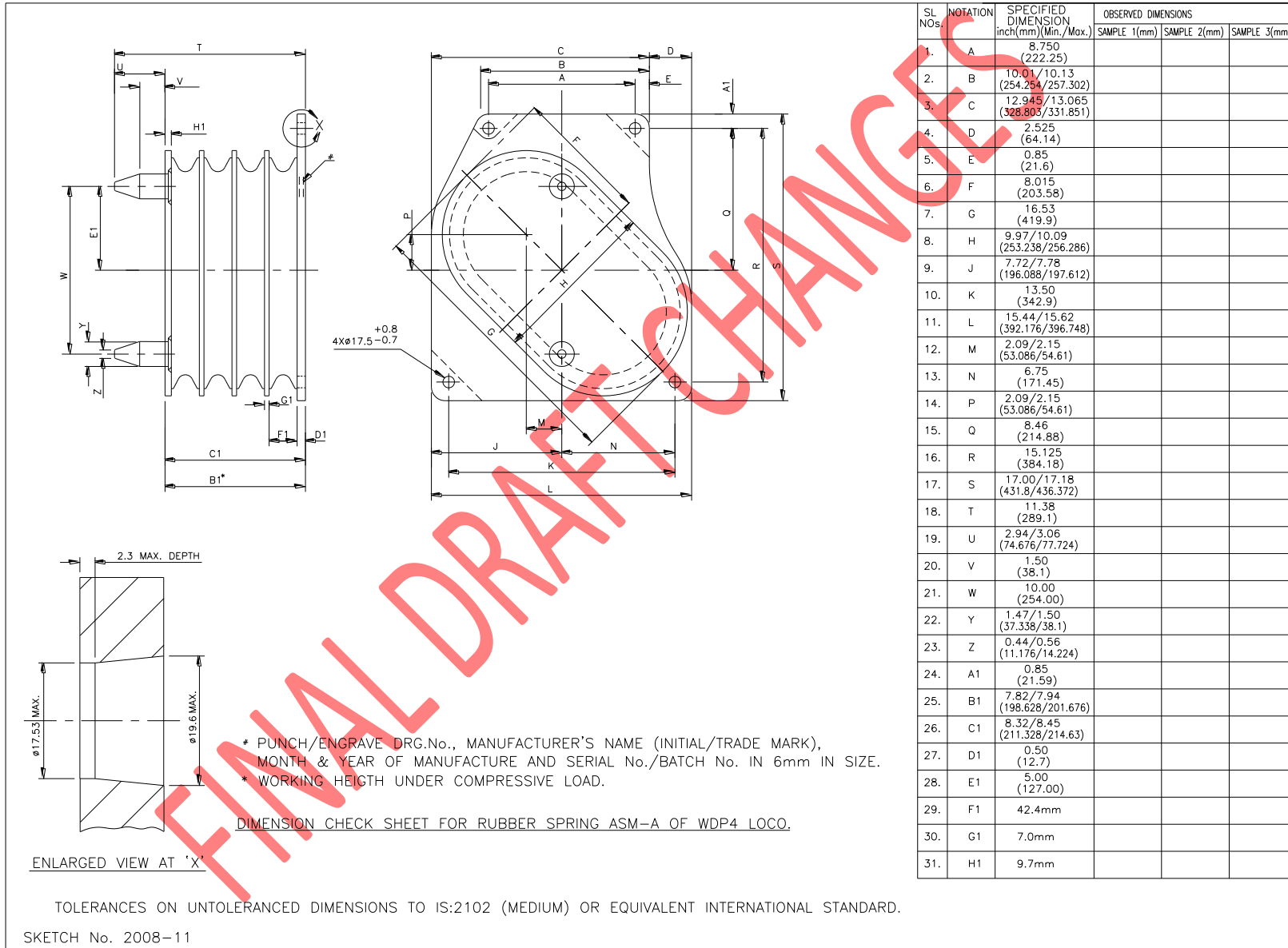
Sample No.	1	2	3	Remarks
Visual Check				
Identification Marking				

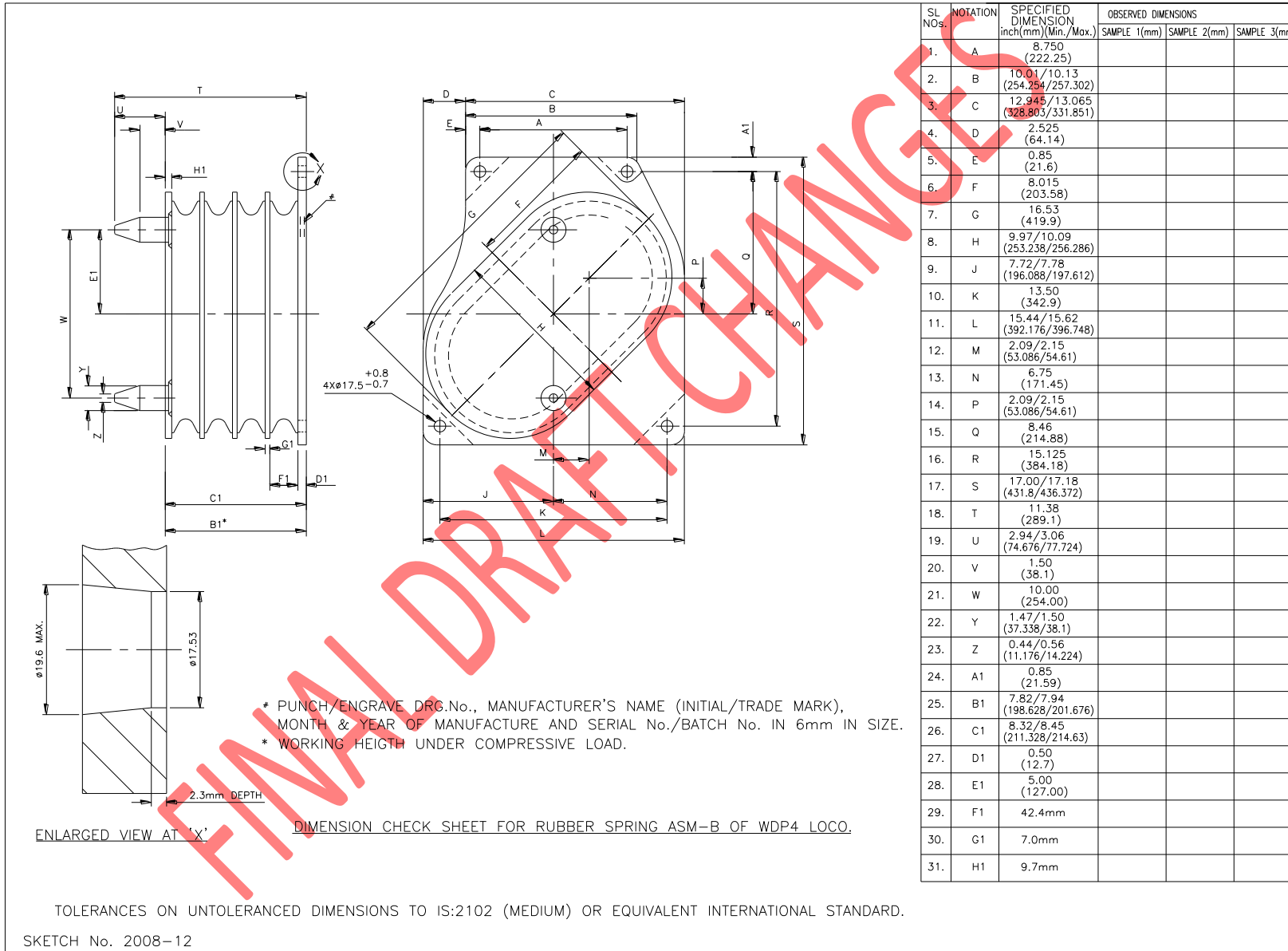
D. Dimensional Checks:

- i. Dimensional check sheet of Rubber Spring for WDG4, WDG4D, WDP4B & WDP4D locomotives at Format -IV.
- ii. Dimensional check sheet of WDP4 Rubber Spring at Format – V & VI.

Quality Control Manager of Firm	Authorised Representative of Inspecting Agency







SECTION-B**MINIMUM TECHNICAL REQUIREMENTS FOR APPROVAL OF VENDORS FOR MANUFACTURE OF RUBBER SPRING ASSEMBLY FOR HHP DIESEL LOCOMOTIVES****1. SCOPE**

The Schedule of Technical Requirement is to assess the manufacturing & testing capability of the vendors for Rubber Spring Asm for HHP Diesel locomotives

2. REFERENCE DOCUMENTS AND STANDARDS

The firm shall have copies of latest versions of the following specifications & Standards /codes:

Sl.	Standards No. *	Description
1.	ASTM D-412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
2.	ASTM D-2240	Standard Test Method for Rubber Property—Durometer Hardness
3.	ASTM D-573	Standard Test Method for Rubber—Deterioration in an Air Oven
4.	ASTM D-395	Standard Test Methods for Rubber Property—Compression Set
5.	ASTM D 1171	Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
6.	ASTM D 2137	Standard Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
7.	IS: 2102	General Tolerances for Dimensions and Form and Position
8.	IS: 9139	Specification for Malleable Iron Shots and Grits for Use in Foundries
9.	ISO: 3302	Specification for Dimensional Tolerances of Solid Moulded and Extruded Rubber Products
10.	IS: 13867	Rubber — General Procedures for Preparing and Conditioning Test Pieces for Physical Test Methods

*or equivalent IS standards.

3.0 GENERAL

- .1 The firm shall have ISO: 9000 series certification for manufacturing of Rubber to metal bonded items for locomotives.
- .2 The firm shall have a system of documentation for the following:
 - .1 Testing of incoming raw material with reference to Test Certificate issued by the supplier and the internal tests carried out by the firms for verification.
 - .2 System of ensuring quality of bought out components & their inspection records.
 - .3 Calibration of tools & equipment used in manufacturing, assemblies & testing.

4.0 GENERAL INFRASTRUCTURES

The firm shall have adequate space & covered area with material handling facility of adequate capacity to accommodate the following activities:

- .1 Raw material storage
- .2 Laboratories of material testing
- .3 Manufacturing facilities
- .4 Enclosed environment free from dust, dampness & humidity free for assembly and testing
- .5 Painting facility

5.0 MANUFACTURING FACILITIES

Following manufacturing facilities shall be available with the firm:

- .1 firm shall have an injection moulding machine of adequate capacity for manufacturing of Rubber Spring Assemblies.

The Injection Moulding machine should have following features –

- (i) Pre-plasticizing and Injection system

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- (ii) Mould Clamping System
- (iii) Hydraulic Power System
- (iv) Heating/Cooling System
- (v) PLC based control with adequate clamping force
- .2 Bench grinding machines to remove sharp edges from the sheared/blanked or bent steel plates
- .3 Shot blasting machine with adequate table diameter. The shot blasting machine shall have in-built sieving facility to screen under-sized shots.
- .4 Degreasing machine to remove accumulated dirt/dust, black spots etc.
- .5 Press for shearing / cutting of steel plate up-to thickness 16 mm in one stroke. Alternately, a press of Min. 250T capacity for shearing / cutting of steel plates.
- .6 Suitable spraying facilities for application of adhesive. The spraying machine shall have an in-built provision of stirring the adhesive.
- .7 A dirt/dust free room with proper exhausts facility for adhesive application
- .8 Elcometer or any other scientific & accurate measuring equipment available to measure the thickness of adhesive coats at primer application & final application stage. The instrument shall be capable of measuring the thickness of coating in microns.
- .9 Firm shall have a system to measure the adhesive film thickness at the specified frequency and the same is recorded.
- .10 Close mixing mill (Banbury) of suitable capacity for mixing purpose or kneader with suitable cooling arrangement shall be available. A digital temperature indicator for monitoring the temperature of kneader chamber during mixing of rubber compound to avoid scorching.
- .11 Open mixing mill for sizing of rubber sheets. The open mixing mill shall be equipped with suitable cooling arrangement and digital temperature indicator.
- .12 Suitable facility for cutting of Rubber strips is available with firm size presses for cutting rubber blanks. ~~Manufacturer shall ensure that a suitable size die and punch facility to cut the blanks to the size.~~
- .13 Suitably designed dies & injection moulds as per relevant specification and drawing.
- .14 Manufacturers shall have a system of measurement of moulds for their accuracy for various dimensions and profile on weekly basis or after a production of 500 pieces, whichever is earlier and the observations of the mould are recorded.
- .15 Manufacturers shall ensure that the system exists to check the dimensional accuracy of the mould before its use.
- .16 In-house availability of minimum infrastructure for maintenance and polishing of dies and moulds.

6.0 INSPECTION & TESTING FACILITIES**Following inspection & testing facilities are required:**

- .1 Laboratories with controlled environment, to maintain standard temperature and humidity for rubber testing as per IS 13867.
- .2 Tensile testing machine capable to read the load and elongation as per the requirement of the product. The tensile testing machine shall have all the provisions as per ASTM D 412.
- .3 Manufacturers shall ensure a Rheometer to analyze the complex flow characteristics of polymer solutions. Ensure that a record is maintained of the batches checked on Rheometer.
- .4 Minimum two air ovens to facilitate the testing of rubber product specimen attached with automatic continuous time temperature recorder to record the exact temperature duration of ageing.
- .5 Minimum two Shores 'A' hardness tester with standard test pieces.
- .6 Minimum one number Muffle furnace
- .7 Minimum one number Specific gravity testing apparatus.
- .8 Facility exists to check the viscosity of the adhesive.
- .9 Following measuring instruments in adequate number should be available –

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- (a) Micrometers (b) Dial gauge (c) Vernier calipers (e) Scale
- .10 Suitable facilities for cutting the test specimen as per standards.
 - .11 Ozone test machine attached with automatic continuous time temperature recorder to record the exact temperature duration of ageing.
 - .12 Low temperature testing machine with minimum capacity of -40 degree centigrade for 3 minute.
 - .13 Equipment to test Compression Set as per ASTM D-395 with suitable steel spacers.
 - .14 Adequate number of Go & No-Go gauges to check the dimensional accuracy of the steel plates and also the product at intermediate stage & final stage.
 - .15 Manufacturers shall ensure that the Go & No-Go gauges are calibrated on due dates and records of calibration are maintained. The Go & No-Go gauges shall have a mention of the due date of calibration.
 - .16 Universal testing machine or suitable test equipment with load indicator having a least-count of minimum 20.0 kg with adequate capacity to apply the required load for conducting tests as specified in relevant specification, drawing(s) along with the facility to draw a graph for load deflection characteristics.

7.0 Quality control requirements:

- .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.
- .2 Firm shall have a system of 'FIFO' for raw material and the intermediate stage product.
- .3 The firm shall have a system to ensure that moulds are checked at regular interval to maintain dimensionally accurate before release for production.
- .4 Calibrations of the testing, measuring & weighing equipment shall be done at least once in year, unless stated otherwise.
- .5 Firm shall have a quality manual indicating the extent of controls over manufacturing and testing of the products.
- .6 The firm shall have a system of regular submission of rejections, detailing rejection rate, cause of rejection, corrective action taken etc. on quarterly basis.
- .7 The Firm shall have a system of documentation in respect of rejection at customer end, warranty replacement and failures of the products.
- .8 The Firm shall have a system of recording plant, machinery & control equipments remaining out of service, nature of repair done etc.
- .9 The manufacturer shall submit Quality Assurance Plan (QAP) of the relevant products as per the standard format for approval. QAP shall cover all aspects of process / quality control requirement to obtain quality product.
- .10 The firm shall maintain a record of QAP implementation for documentary evidence.
- .11 The firm shall have latest version of relevant standards and drawings.

8.0 Qualification & Training:

- .1 The firm shall have at least one full time rubber technologist having minimum Bachelor's with 5 years of experience or Diploma in relevant field with 12 years of experience.
- .2 Qualification of person working as in-charge of the Quality Control Section shall have minimum qualification Bachelor's degree with 5 years of experience or Diploma holder with min 12 years of experience.
- .3 NDT inspection staff conducting non-destructive testing should be trained & qualified by recognized agency.

9.0 PREFERENCE TO MAKE IN INDIA

The government of India policy on 'Make in India' shall apply.

**PROFORMA FOR FEEDBACK OF RUBBER SPRING ASSEMBLY OF HHP DIESEL LOCOMOTIVE
AS PER GM EMD Part No. -----**

Shed Date

S.No.	Loco No. & type	Commission Date	Rubber Spring Make	Location	Rubber Spring Fitment Date	Whether Still in Service (Y/N)	Removal date, if any	Reason for removal	Life Obtained till date	Investigation report, if any	Remarks, if any	
1.				L1								
				L2								
				L3								
				L4								
				R1								
				R2								
				R3								
				R4								
2.				L1								
				L2								
				L3								
				L4								
				R1								
				R2								
				R3								
				R4								

FINAL DRAFT CHANGES

Revised draft of IB No. MP.IB.VL-05.33.08 (Rev. 02) for 'Instructions regarding material, tests and inspection of Rubber Spring Assembly used on HHP Diesel locomotive bogies was sent to existing vendors and Railways vide a letter for Comments & suggestion. Only M/s Basant Rubber Factory Pvt. Ltd., has submitted their comments on Instruction Bulletin. No another approved/ developmental vendor or any other party has submitted their comments on Instruction Bulletin. Reasoned document based on comments of above firms on Instruction Bulletin which is used for locomotives (other than noted & complied) and internal review by RDSO is tabulated below:

Clause of Spec.	Contents as per draft spec	Comments / deviation offered by Vendors						RDSO Remarks
		M/s Basant Rubber Factory Pvt. Ltd., Mumbai (Page No.384-385)	M/s Prag Industries (India) Pvt. Ltd., Lucknow	M/s Aryan Exporter (India) Pvt. Ltd., Lucknow	M/s MGM Rubber, Kolkata	M/s EMD,USA	M/s Lord, USA	
5.2	Bench grinding machines to remove sharp edges from the sheared/blanked or bent steel plates	Bench grinding machines to remove sharp edges from the sheared/blanked or bend steel plates. Remarks: Typographical error	-	-	-	-	-	No changed required. "
5.12	Suitable size presses for cutting rubber blanks. Manufacturer shall ensure that a suitable size die and punch facility to cut the blanks to the size.	Not applicable as this won't be of any use. Remarks: Injection moulding process is specified for production	-	-	-	-	-	Para has been reviewed in view of Injection moulding & subsequently modified as "Suitable facility for cutting of Rubber strips is available with firm."