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**QM-C-7.1/Polymer/0001/A**  
**Inspection Plan(Check Sheet)**

**Item:** Constant contact PU Side Bearer Pads for NLB Bogies  
**Specn. :** WD-38 Misc-2004 Rev 1 of Jan'08  
**Amd.:** 1 of Mar'08  
**Drg. No. & Alt.:** AAL-021101 / N Alt 1

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1. Firm's Name :
2. Date (period) of Inspection :
3. Contract Details :
  - a. Contract no. and date.
  - b. Order placing authority.
  - c. Specification no.  
(as mentioned in contract)
  - d. Drawing no.  
(as mentioned in contract)
4. Quantity on order
5. Quantity offered for inspection on date
6. Consignee
7. Delivery Period

Quality Control Manager of M/s

Inspecting Official of RDSO



### Summary of results

Sr.No.	Parameters	Specified value		Observation	
				Max.	Min.
8.1	Visual Check	Free from Air Bubbles, surface streaks, splash marks, Pin holes, voids, blistering			
8.2	Dimensional Check				
8.3	Physical Properties				
Before Ageing	Tensile Strength Min.	200 Kg/Cm <sup>2</sup>			
	Elongation at Break Min.	300%			
	Hardness of PU Ring Shore A Min.	87			
	Hardness of TPU Sleeve Shore A Min.	95			
	Ash Content Max.	1%			
	Specific Gravity of PU Ring Max.	1.20			
	Specific Gravity of TPU Sleeve Max.	1.30			
8.4					
After Ageing change at 70 <sup>±</sup> 1 <sup>°</sup> C for 24 +0/ - 2 Hrs.	Tensile Strength	± 25%			
	Elongation at break	± 25%			
	Hardness	+3 / -2 <sup>°</sup> Shore A			
	Compression Set Max.	25%			
8.5	Resistance to Hydrolysis				
	Boiling in distilled water at atmospheric pressure for 72 +0/-2 Hrs				
	change in Tensile strength	± 25%			
	Change in elongation at break	+50 /-0.0%			
8.6	Hardness Shore A	+0.0 / -7.0			
	Compressive Load Deflection Test				
	At 2.25 t	Max. 12.0 mm	Min 10.0 mm		
8.6.1	Strength Test	Should not home at 45.0t			
8.7	Fatigue Test	Permanent set after fatigue test 4.0 mm Max.			
8.7.1	Condition of Pad after fatigue Test	Any component shall not show any sign of cracking /perishing and metallic component shall not show any sign of deformation, crack or damage			



**TEST RESULTS**  
**(Maximum Lot Size 2000 Side Bearer Assemblies)**

8.1 Visual Check:-  
 Specification: Polyurethane component shall be smooth, free from air bubbles, surface streaks, splash mark, pin hole, voids  
 Specified sample size – 20 assemblies  
 Actual sample size – assemblies

Assembly No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Visual Check																					

8.2 Dimensional Check-  
 Specified sample size – 20 assemblies  
 Actual sample size – assemblies

Assembly No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Top Housing																					
158± 2.5																					
71 ± 0.8																					
57 ± 2.0																					
136 ± 0.8																					
87.5 ± 0.8																					
Bottom Housing																					
280 ± 2.5																					
150 ± 2.5																					
130 ± 0.8																					
110 ± 0.8																					
15 ± 0.5																					
216 ± 0.5																					
21.5 ± 0.5																					
134 ± 1.5																					
PU Ring																					
101±2x40±2x33±0.7																					
TPU Sleeve																					
136X132X71 (T)																					
110X106X44.5 (B)																					
Spacer Plate																					
104 ± 0.8																					
6 ± 0.5																					
Th. 32.00 ± 1.3																					
Solid Plate																					
109 +0/-1.0																					
30.5 ± 0.5																					

Note: Tolerance Taken as per Firms Drawing and QAP approved by Wagon Directorate, RDSO.  
 (All dimensions in mm)

Quality Control Manager of M/s

Inspecting Official of RDSO



8.3 Physical properties of PU Ring before Ageing  
 Specified sample size – 2 assemblies  
 Actual sample size – assemblies

A. Tensile Strength :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm <sup>2</sup> )							
Load at break (kg)							
Tensile Strength	200Kg/cm <sup>2</sup> (min)						
Mid Value							

B. Elongation at break :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Bench Length (mm)							
Length at break (mm)							
Elongation (%)	300% min.						
Mid Value							

C. Compression Set (at 70 ± 1°C for 24 +0/-2 Hrs) :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness before ageing(mm)							
Spacer Thickness (mm)							
Thickness after ageing (mm)							
Compression Set	25% (max.)						
Average Compression Set							

D. Hardness of PU Ring :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Hardness Shore 'A'							
Mid Value	87 (Min.)						



E. Hardness of TPU Sleeve:

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Hardness Shore 'A'							
Mid Value	95 (Min.)						

F. Specific Gravity of PU :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	B	c
Specific Gravity	1.20 (Max.)						
Mid Value							

G. Specific Gravity of TPU Sleeve

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Specific Gravity	1.30 (Max.)						
Mid Value							

H. Ash Content :- Specified Value 1% (max.)

Parameters	1			2		
	a	b	c	a	b	c
Wt. of Crucible						
Wt. of Crucible + Sample						
Wt. of Sample						
Wt. of Crucible + Ash						
Wt. of Ash						
Ash Content %						

8.4 Physical Properties after Ageing (at 70 ± 1°C for 24 +0/-2 Hrs.)

Specified sample size – 2 assemblies

Actual sample size – assemblies

A- Tensile Strength :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	C
Thickness (mm)							
Width (mm)							
Area (mm <sup>2</sup> )							
Load at break (kg)							
Tensile Strength (kg/cm <sup>2</sup> )							
Mid Value							
% change after ageing	± 25%						



**B- Elongation at Break :-**

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Bench Length (mm)							
Length at break (mm)							
Elongation %							
Mid Value							
% change after ageing	± 25%						

**C- Hardness of PU Donut :-**

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Hardness Shore 'A'							
Mid Value							
Change in Hardness	+3/-2						

8.5 Resistance to Hydrolysis : 2 Assemblies (Verify firm's internal test records & record the following)

Boiling in distilled water at atmospheric pressure for 72 +0/-2 Hrs.

**A Tensile Strength :-**

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm <sup>2</sup> )							
Load at break (kg)							
Tensile Strength							
Mid Value							
% change	± 25%						

**B Elongation at break :-**

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Bench Length (mm)							
Length at break (mm)							
Elongation %							
Mid Value							
% change	+50/-0						

**C Hardness :-**

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Hardness Shore 'A'							
Mid Value							
Change in Hardness	+0.0/-7.0						

Note : Permissible Limit for item 8.3, 8.4, & 8.5 are as per firms QAP approved by Wagon Dte, RDSO.

Quality Control Manager of M/s

Inspecting Official of RDSO



8.6 Compressive Load Deflection Test

Specified sample size 20 assemblies

Actual Sample size assemblies

Atmospheric temperature –  $27 \pm 2^\circ\text{C}$

Machine Speed :  $10 \pm 5$  mm/minute

Three successive loading up to 2.25 t. During the fourth cycle the pad shall be compressed with load of 50 Kg., deflection taken at Zero at this point.

<b>Load</b>	<b>Sp. Value</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
2.25 Ton	10.0 to 12.0										
<b>Load</b>	<b>Sp. Value</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
2.25 Ton	10.0 to 12.0										

8.6.1 Strength Test

Specified sample size 5 assemblies

Actual Sample size assemblies

Three successive loading upto 45 Tonnes at a interval of 1.0 Minutes

Load (45 Tonnes)	Observation				
	1	2	3	4	5
Condition of Assembly					

The pad should not home (solid) and no damage to any component.

8.7 Fatigue Test in Vertical Mode : as per specification clause 9.4

Specified sample size : 1 assembly

Actual Sample size assembly

Load in Tonnes	No. of Cycles	Frequency
0 to 4.0	10,00,000	2 HZ
0 to 4.5	6000	1.5 HZ
0 to 5.0	2000	1.0 HZ
0 to 6.0	1000	0.5 HZ

Specified Permanent Set (4 mm Max.)

(Observed set to be measured after 10 minutes of testing but not later than 20 minutes)

No. of assemblies	Height before Fatigue	Height after Fatigue	Permanent set in mm

8.8	Whether any sign of cracking/perishing in the polyurethane components and sign of deformation/damage in metallic components	Assembly	Yes/No
		1	
		2	