



QM-C-7.1/Rubber/0013
Inspection Plan(Check Sheet)

Item : Centre Pivot Liner for Locomotives
Specn. : MP.0.40.99.02 (Rev. 01) of Oct'2012
Amd. :
Drg. No. & Alt. : SK.DL-3255 Alt.2

1. Firm's Name :
2. Date (period) of Inspection :
3. Contact Details as per PO
 - a. Contact No. and Date. :
 - b. Order placing authority :
 - c. Specification No :
 - d. Drawing No :
4. Quantity in Purchase order :
5. Quantity offered for inspection :
6. Consignee :
7. Validity of D.P. of P.O. :
8. Remarks on internal checks carried out by the firm :
9. Remarks on calibration of Measuring Instruments & Testing Facilities :

Quality control Manager of M/s

Inspecting official of RDSO



1. Sample Size

The lot size of Centre Pivot Liners to be offered in one inspection shall be 50 nos. or full quantity if the order is for less than 50 nos. The sample size for following tests is detailed below:

Sl.	Test	Sample Size
1.	Visual Inspection	05 Nos.
2.	Dimensional check	05 Nos.
3.	Specific Gravity	02 Nos.
4.	Tensile Strength	02 Nos.
5.	Hardness	05 Nos.
6.	Compression Set	02 Nos.
7.	Water Absorption Test	02 Nos.
8.	Compressive Strength	02 Nos.
9.	Izod Impact Strength (Notch)	02 Nos.
10.	Flexural Modulus	02 Nos.

If the quantity offered for inspection is less than 50 nos., the sample sizes will be as per a lot of 50 nos. as mentioned above.

Additional Tests for Prototype Approval:

Sl.	Test	Sample Size
1.	Type of Polymer (Polymer Identification)	01 Nos.
2.	Coefficient of friction (between Polymer and steel)	02 Nos.
3.	Wear Rate	02 Nos.
4.	Melting Point	02 Nos.
5.	Oil Resistance test	02 Nos.

2. Visual, Dimensional Checks & Physical properties Tests

a. Visual Checks

Centre pivot liners shall be smooth, free from air bubbles, surface streaks, splash marks, pinholes, voids, crazing, blistering etc. All the edges shall be neatly finished and shall be free from splash and Marking

b. Dimensional Checks

The Centre pivot liners shall conform to the dimensions and tolerances as given in relevant drawings.

c. Physical properties test

Following physical property tests should be carried out and test results shall be recorded in the check sheet provided with this Inspection Plan.

Sr.	Property	Test Method	Units	Permissible Limit
1.	Specific Gravity	ASTM D 792	-	1.12 to 1.25
2.	Hardness	ASTM D 2240	Shore 'D'	80 – 90
3.	Tensile Strength at Yield	ASTM D 638	MPa	70 (Minimum)
4.	Compressive Strength at 5% deflection	ASTM D 695	MPa	85 (Minimum)



5.	Izod Impact Strength (Notch)	ASTM D 256	Joules/ m	25 (Minimum)
6.	Flexural Modulus	ASTM D 790	MPa	2700 (Minimum)
7.	Water Absorption at 23°C temp. after 24 hrs. immersion	ASTM D 570	%	0.6 (Maximum)
8.	Compression set at 80° ± 1°C for 24 (+0 /-2) hours)	ASTM D 395	%	30(Maximum)
9.	Coefficient of friction (between polymer and steel)	ASTM D 1894	-	0.15-0.2
10.	Wear Rate	ISO 7148-2 (Pin on-disc)	µm/km	12 (Maximum)
11.	Melting Point	ASTM D 3418	°C	200 (Minimum)
12.	Oil resistance test at 100±1 °C for 72 (+0/-2) hrs. immersion Specified value: In lubrex-150 In Grease (Servogem 2 or 3):	IS:3400 (Part 6)	%	5% swelling (maximum) 5% swelling (maximum)

3. **STAMPING:** As per para 11.5 of Spec. **OK/NOT OK**
4. **MARKING:** As per para 13 of Spec. **OK/NOT OK**
5. **PACKING:** As per para 14 of Spec. **OK/NOT OK**
6. **Storage:** As per para 15 of Spec. **OK/NOT OK**

Quality control Manager of M/s

Inspecting official of RDSO



MATERIAL PROPERTIES CHECK SHEET

i. Specific gravity (Specified Value: 1.12 to 1.25)

Property	Test method	Observed Value		Remarks
		Sample 1	Sample 2	
Specific Gravity	ASTM D 792			
		Mean Value:		

ii. Hardness (Specified Value: 80-90 Shore D)

Test method: ASTM D 2240		Observed Value					Remarks
		a	b	c	d	e	
Sample 1	Hardness						
	Mean Value						
Sample 2	Hardness						
	Mean Value						
Sample 3	Hardness						
	Mean Value						
Sample 4	Hardness						
	Mean Value						
Sample 5	Hardness						
	Mean Value						

iii. Tensile Strength at Yield (Specified Value: 70 MPa (minimum))

Property	Test method	Observed Value										Remarks	
		Sample 1					Sample 2						
		a	b	c	d	e	a	b	c	d	e		
Tensile Strength at Yield (MPa)	ASTM D 638												
		Mean Value:											

iv. Compressive Strength at 5% deflection (Specified Value: 85 MPa (minimum))

Property	Test method	Observed Value										Remarks	
		Sample 1					Sample 2						
		a	b	c	d	e	a	b	c	d	e		
Compressive Strength (MPa)	ASTM D 695												
		Mean Value:											

Quality control Manager of M/s

Inspecting official of RDSO



v. Izod impact Strength [Notch] (Specified Value: 25 J/m (minimum))

Property	Test method	Observed Value										Remarks
		Sample 1					Sample 2					
		a	b	c	d	e	a	b	c	d	e	
Izod impact Strength (J/m)	ASTM D 256											
		Mean Value:										

vi. Flexural modulus (Specified Value: 2700 MPa (minimum))

Property	Test method	Observed Value										Remarks
		Sample 1					Sample 2					
		a	b	c	d	e	a	b	c	d	e	
Flexural modulus (MPa)	ASTM D 790											
		Mean Value:										

vii. Water absorption at 23^oC for 24 hrs. immersion (Specified Value: 0.6 % (maximum))

Parameters	Test method	Observed Value				Remarks
		Sample 1		Sample 2		
		a	b	c	d	
Water absorption (%)	ASTM D 570					
		Mean Value:				

viii. Compression Set at 80±1^oC for 24(+0/-2) hrs. (Specified Value: 30 % (maximum))

Property	Test method	Observed Value						Remarks
		Sample 1			Sample 2			
		a	b	c	a	b	c	
Compression Set (%)	ASTM D 395							
		Mean Value:						



VISUAL AND DIMENSIONAL CHECK SHEET

A. Lot No.:

B. Visual Check:

	Sample No.					Remarks
	1	2	3	4	5	
Visual Check						
Identification Marking						

C. Dimensional Check:

Drawing No.:						Remarks
Dimension As per relevant drawing	Sample No.					
	1	2	3	4	5	



Additional Tests for Prototype Approval

i. Type of Polymer (Polymer identification)

Name of Polymer	Test method/ document	Observation	Remarks

ii. Coefficient of friction (Specified Value: 0.15-0.2)

Property	Test method	Observed Value						Remarks
		Sample 1			Sample 2			
		a	b	c	a	b	c	
Coefficient of friction	ASTM D 1894							
		Mean Value:						

iii. Wear rate (Specified value: 12µm/km (maximum))

Property	Test method	Observed Value		Remarks
		Sample 1	Sample 2	
Wear rate	ISO 7148-2 (Pin on disc Method)			
		Mean Value:		

iv. Melting Point (Specified value:200°C)

Property	Test method	Observed Value		Remarks
		Sample 1	Sample 2	
Melting Point (°C)	ASTM D 3418			
		Mean Value:		

v. Oil resistance test at 100±1 °C for 72 (+0/-2) hrs. immersion
Specified value: In lubrex-150: 5% swelling (maximum)
In Grease (Servogem 2 or 3): 5% swelling (maximum)

Property	Test method	Observed Value						Remarks
		Sample 1			Sample 2			
		a	b	c	a	b	c	
Swelling in Lubrex-150 (%)	IS:3400 Part 6							
		Mean Value:						
Swelling in Grease (Servogem 2 or 3) %	IS:3400 Part 6							
		Mean Value						

Quality control Manager of M/s

Inspecting official of RDSO