

The emblem of India is a black and white line drawing of the Lion Capital of Ashoka. It features four Asiatic lions standing back to back on a high, circular abacus. The abacus is decorated with a frieze of four galloping horses on the left and two elephants on the right, separated by a large wheel (Chakras) in the center. The entire structure is topped by a bell-shaped lotus.

**ISSUED BY:
CARRIAGE DIRECTORATE
RESEARCH DESIGN AND STANDARDS ORGANIZATION
MANAK NAGAR, LUCKNOW - 226011**

FUNCTIONAL REQUIREMENTS SPECIFICATION FOR TPU RINGS FOR FIAT BOGIES OF LHB COACHES

1. FOREWORD

Indian Railway is intended to develop a Technical Specification & STR for 'TPU Rings for FIAT Bogies of LHB Coaches' for max. operating speed of 200 Km/h.

2. SCOPE

This document covers the functional requirements for the 'TPU Rings for FIAT Bogies of LHB Coaches'

3. FUNCTIONAL REQUIREMENTS

3.1 PURPOSE OF USE:

Thermoplastic Polyurethane (TPU) spring pads, or TPU rings, are used in Indian Railways to enhance cushioning, performance, and longevity suspension of the coaching stock. They absorb shocks and reduce vibrations, ensuring passenger comfort and reducing component wear. TPU rings evenly distribute loads, preventing stress points and premature failure of coil springs. Known for their durability and resistance to abrasion, chemicals, and weathering, TPU rings extend component life.

3.2 DESIRED CHARACTERISTICS:

3.3 Physical Properties

The checks shall be conducted as per methods given in ASTM/ ISO Standards mentioned below and their values shall conform to the following limits:

Sl.	Property	Test Method	Units	Permissible Limit
1.	Specific Gravity	ASTM D792/ ISO 1183-1	-	1.12 to 1.25
2.	Tensile Strength	ASTM D638 / ISO 527-1 & ISO 527-3	kg/cm ²	250 (Minimum)
3.	Elongation at Break	ASTM D638/ ISO 527-1 & ISO 527-3	%	300 (Minimum)
4.	Hardness	ISO 868	Shore 'A'	85 - 95
5.	Compression Set at 800 ± 10C for 24 (+0/-2) hours	ISO 815	%	45 (Maximum)

3.4 Oil Resistance Test

The swelling as determined by the method given in IS: 3400 (Part VI) using an immersion period of 72 (+0 / -2) hours at 100 ± 10 C shall not be more than the limits given below:

Sl.	Volume Swelling Medium	Permissible Limit
1.	In Lubrex -150	20 % (Maximum)
2.	In Grease (Servo gem 2 or 3)	15 % (Maximum)

3.5 Resistance to Hydrolysis

After Hydrolysis on boiling in distilled water at atmospheric pressure for 72 (+0/-2) hours, the tensile strength, elongation at break and hardness shall not vary from the value obtained before boiling by more than the following limits:

Sl.	Property	Permissible Limit
1.	Tensile Strength	± 20 %
2.	Elongation at break	± 20%
3.	Hardness (Shore 'A')	± 5

3.6 Compressive Load-Deflection Test

Location of TPU Ring	Load in Tonnes		Drawing No. of Coil Springs	
	Outer	Inner	Outer	Inner
Primary coil Spring	6.5	4.5	1267411, 1277142 LG01 100	1267412, 1277143 LG01 101
Secondary Coil Spring	9	6	LG05101, 1277146 1268836, 1269514	LG05100, 1277145 1268837, 126951 3
The deflection of TPU Rings to be submitted by firms				

4 / 4.1 WEATHER CONDITION

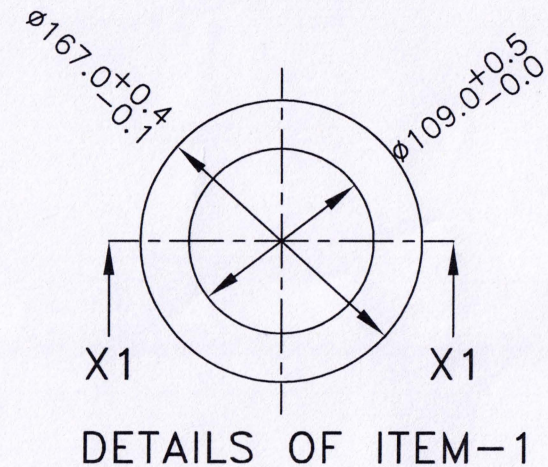
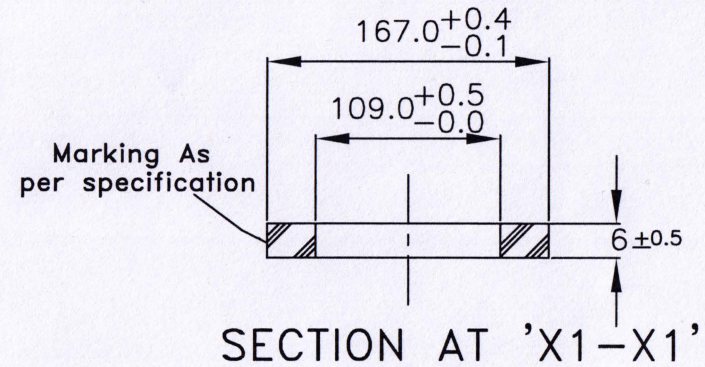
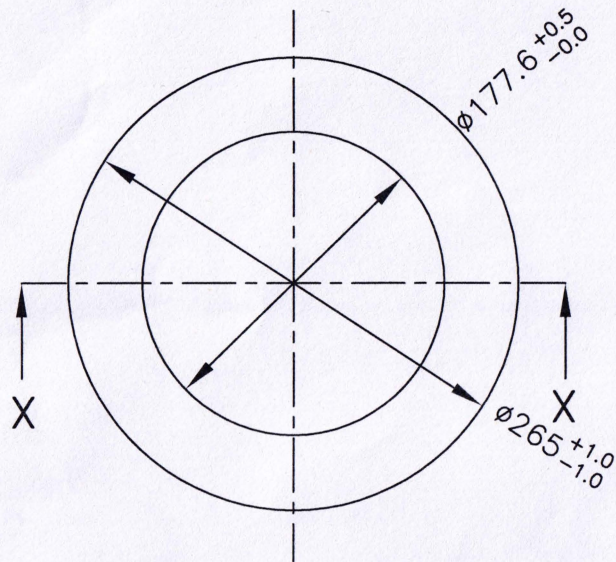
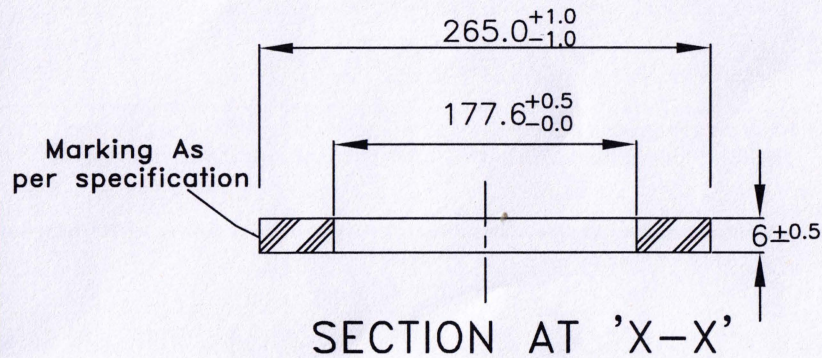
The TPU Rings are used very widely under the severe weather conditions. The limiting conditions, which have to be withstood in service, are indicated below:

S. No.	Weather condition	Limiting conditions
1	Maximum temperature	+70° C
2	Minimum temperature	-20° C
3	Max. temperature attainable by an object exposed to sun(current carrying object)	100° C
4	Maximum Relative humidity	Up to 100%
5	Average Annual Rainfall	1750 to 6250 mm
9	Maximum wind pressure	200 Kg/Sq. meter
10	Altitude	Up to 3000 m

4.2 Coach-body displacement encountered under dynamic conditions.

- | | | |
|------|------------------------------------|----------|
| i) | Vertically- | ±55 mm |
| ii) | Laterally - | ±100 mm |
| ii) | Longitudinally- | ±10 mm |
| iii) | Bogie rotation about center pivot- | ±4° |
| iv) | Maximum Speed of train - | 200 KMPH |

Note: Above functional requirements are indicative and not exhaustive.



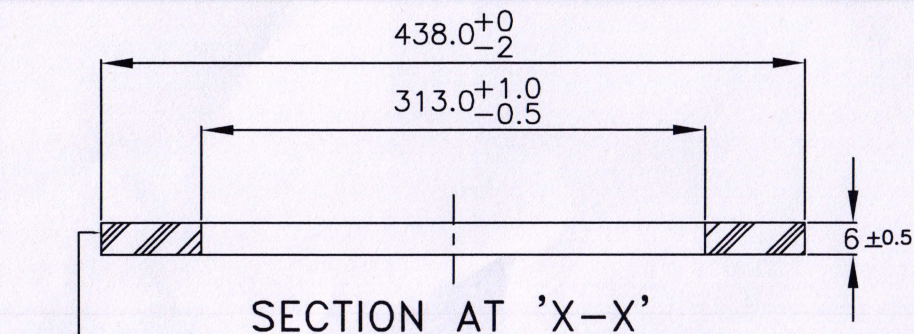
ALL DIMENSIONS ARE IN mm.

NOTE: FOR MATERIAL SPECIFICATION, MANUFACTURING, INSPECTION AND TESTING OF TPU RING (HAPPY PAD) REFER TO RDSO SPECIFICATION NO. MP-0.40.99.01 (REV.-LATEST).

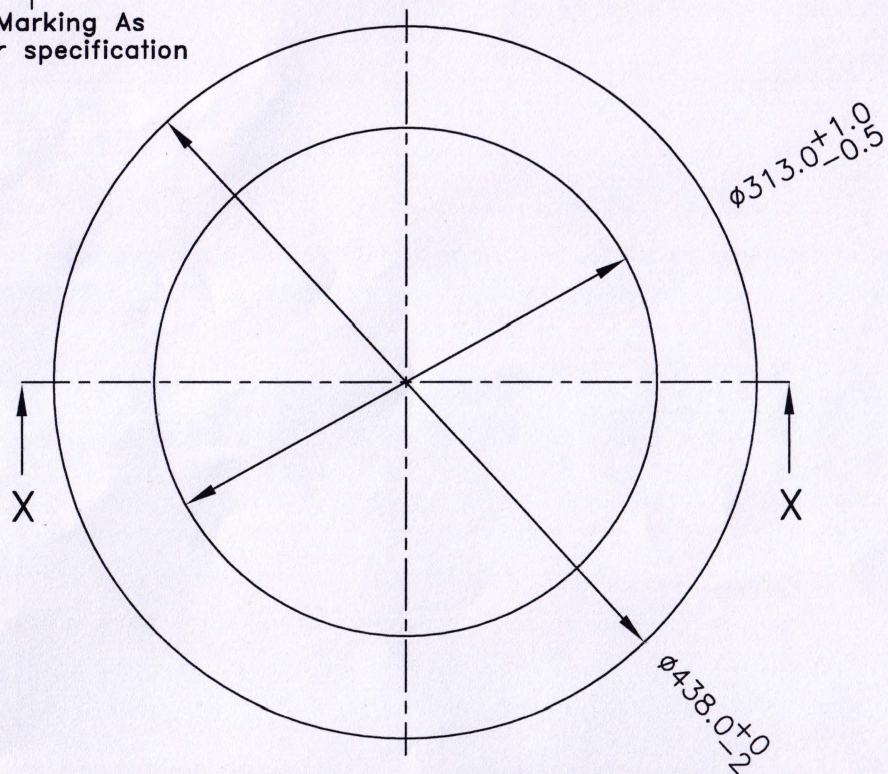
01	Dim.	----	Dimension reviewed	14.05.2024
ALT	ITEM	AUTHY.	DESCRIPTION	DATE

2	TPU RING OUTER, 6 MM THICK	—		AS PER RDSO SPEC NO. MP-0.40.99.1	
1	TPU RING INNER, 6 MM THICK	—		AS PER RDSO SPEC NO. MP-0.40.99.1	
ITEM	DESCRIPTION & DIMENSIONS	QTY PER COACH	Wt OF ONE (gm)	MATL. & SPEC.	REMARKS

RDSO	SUPERSEDED BY:	INDIAN RAILWAY STANDARDS
ASSEMBLY DRGS.	SUPERSEDES:	LHB SHELL ON FIAT BOGIE
REFERENCE:-	SCALE	TPU RING (HAPPY PAD) FOR PRIMARY SUSPENSION OF FIAT BOGIE OF LHB COACHES
	NOT TO SCALE	
	J.S. VDG/02/20	
CHECK SHEET No.	B.G. R.D.S.O. [CG]	CG-20049



Marking As
per specification

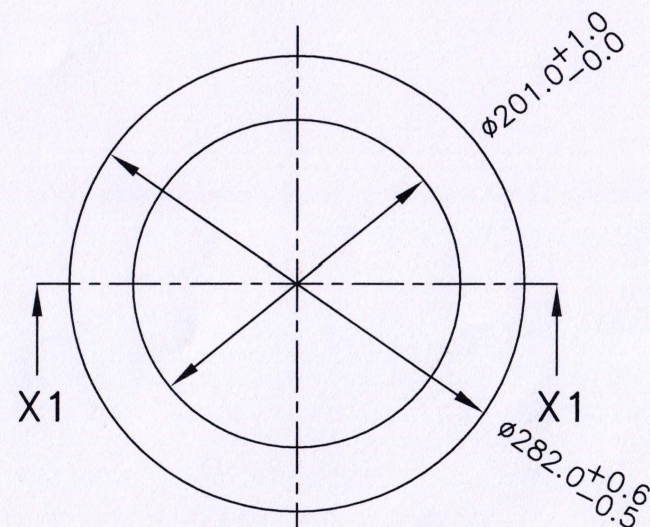
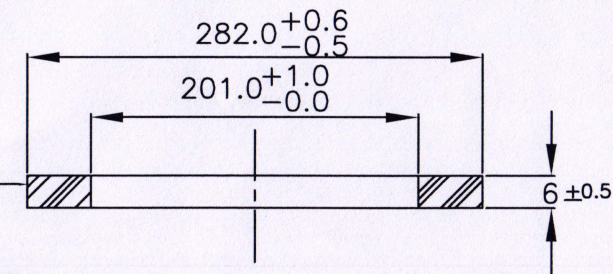


DETAILS OF ITEM-2

NOTE: FOR MATERIAL SPECIFICATION, MANUFACTURING, INSPECTION AND TESTING OF TPU RING (HAPPY PAD) REFER TO RDSO SPECIFICATION NO. MP-0.40.99.01 (REV.-LATEST).

01	Dim.	----	Dimension reviewed	14.05.2024
ALT.	ITEM	AUTHY.	DESCRIPTION	DATE

Marking As
per specification



DETAILS OF ITEM-1

ALL DIMENSIONS ARE IN mm.

2	TPU RING OUTER, 6 MM THICK	-	AS PER RDSO SPEC NO. MP-0.40.99.1	
1	TPU RING INNER, 6 MM THICK	-	AS PER RDSO SPEC NO. MP-0.40.99.1	
ITEM	DESCRIPTION & DIMENSIONS	QTY PER COACH	WT. OF ONE (gm)	MATL. & SPEC.
RDSO		SUPERSEDED BY:		
ASSEMBLY DRGS.		SUPERSEDES:		
REFERENCE:-		INDIAN RAILWAY STANDARDS		
SCALE		LHB SHELL ON FIAT BOGIE		
NOT TO SCALE		TPU RING (HAPPY PAD) FOR SECONDARY SUSPENSION OF FIAT BOGIE OF LHB COACHES		
CHECK SHEET No.		B.G. R.D.S.O. [CG]		
		CG-20057		