



QM-C-7.1/RUBBER/0018
Inspection Plan(Check Sheet)

Item : Rubber Buffer Spring
Specn. : MP-0.41.00.04, Rev.03 of Oct'2011
Amd. :
Drg. No. & Alt. : SKDL-4565

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

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SUMMARY OF RESULT

SN	Parameters	Specified Value	Observation		Result
7.1.1	Dimensional Check	As per drg.			
7.1.2	VISUAL CHECK	No sharp edges or burrs on metal plates. Rubber shall be smooth and free from cracks, pin holes, foreign materials, trapped air blisters and other visual flaws. & marking			
7.1.3	Physical Properties before ageing		Max.	Min.	
a)	Hardness Shore 'A'	70 ± 5			
b)	Tensile Strength	Min 180 Kg/cm ²			
c)	Elongation at rupture	Min 300%			
d)	Modulus of elasticity at 200%	Min 40 kg/cm ²			
7.1.4	Change in physical properties after ageing at 70 ⁰ C for 72±0/- Hrs.		Max.	Min.	
a)	Hardness Shore 'A'	+5/-0			
b)	Tensile Strength	± 20%			
c)	Elongation at rupture	± 30%			
d)	Modulus of elasticity at 200%	± 20%			
7.1.5	Static characteristics	To conform to Cl.5.1 of spec.			
7.1.6	Compression after clamping	To conform to Cl.5.2 of spec.			
7.1.7	Endurance Test	To conform to Cl.5.3 of spec.			
7.1.8	Impact endurance test	To conform to Cl.5.4 of spec.			
7.1.9	Compression set	Max 30%			
7.1.10	Specific gravity	Value of SG shall be maintained as mentioned in approved QAP of the firm in regular manufacture and tolerance of ±0.05 over the SG of the prototype formulation.			
7.1.11	Ash content	5% max.			

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7.1.1 Dimensional Check: (As per drg.)

Sample Size: 5 packs for the lot of 500 packs / 10 packs for the lot of more than 500 packs

Actual Sample:

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

7.1.2 Visual Check:

(No sharp edges or burrs on metal plates. Rubber shall be smooth and free from cracks, pin holes, foreign materials, trapped air blisters and other visual flaws. & marking.)

Sample Size: 5 packs for the lot of 500 packs / 10 packs for the lot of more than 500 packs

Actual Sample:

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

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7.1.3 Physical Properties before ageing.

Sample Size: 1 pack for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual Sample:

A) Hardness:-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Hardness Shore 'A'	70±5						
Mid Value							
Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Hardness Shore 'A'	70±5						
Mid Value							

B) Tensile Strength :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at break (kg)							
Tensile Strength	180Kg/cm ² (min)						
Mid Value							
Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at break (kg)							
Tensile Strength	180Kg/cm ² (min)						
Mid Value							

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C) Elongation at rupture:

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Bench Length (mm)							
Length at break (mm)	80 (Min)						
Elongation (%)	300% min.						
Mid Value							
Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Bench Length (mm)							
Length at break (mm)	80 (Min)						
Elongation (%)	300% min.						
Mid Value							

D) Modulus of elasticity at 200% :

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at 200% elongation							
200% Modulus of elasticity (kg/cm ²)	40Kg/cm ² (min)						
Mid Value							
Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at 200% elongation							
200% Modulus of elasticity (kg/cm ²)	40Kg/cm ² (min)						
Mid Value							

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7.1.4 Physical Properties after ageing.

Sample Size: 1 pack for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual Sample:

A) Hardness:-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Hardness Shore 'A'							
Mid Value							
Change in Hardness	+5 / -0						
Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Hardness Shore 'A'							
Mid Value							
Change in Hardness	+5 / -0						

B) Tensile Strength :-

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at break (kg)							
Tensile Strength							
Mid Value							
Change after ageing	± 20%						
Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at break (kg)							
Tensile Strength							
Mid Value							
Change after ageing	± 20%						

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C) Elongation at rupture:

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Bench Length (mm)							
Length at break (mm)	80 min.						
Elongation (%)	300% min.						
Mid Value							
Change after ageing	± 30%						

Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Bench Length (mm)							
Length at break (mm)	80 min.						
Elongation (%)	300% min.						
Mid Value							
Change after ageing	± 30%						

D) Modulus of elasticity at 200% :

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at 200% elongation							
200% Modulus of elasticity (kg/cm ²)	40Kg/cm ² (min)						
Mid Value							
Change after ageing	± 20%						
Parameters	Permissible Limit	3			4		
		a	b	c	a	b	c
Thickness (mm)							
Width (mm)							
Area (mm ²)							
Load at 200% elongation							
200% Modulus of elasticity (kg/cm ²)	40Kg/cm ² (min)						
Mid Value							
Change after ageing	± 20%						

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**Details of Tests Carried out
Tests on whole Spring Assembly
(Consisting of 4 elements as used)
(Graphs are required to be plotted).**

7.1.5 Static Characteristics: (As per clause 5.1 of specification)

Sample Size: 4 packs for the lot of 500 packs / 8 packs for the lot of more than 500 packs

Actual Sample:

Pack No			1	2	3	4
a)	Free height (4 Buffer Element)	448 ± 4mm				
b)	Pre compression force at 423 mm height	750 kg<F<2000 Kg.				
c)	Compressive force at 398 mm height	1000 kg<F<4000 Kg.				
d)	Compressive force at 363 mm height	5000 kg<F<15000 Kg.				
e)	Compressive force at 313 mm height	50000 kg<F<100000 Kg.				
f)	Stored energy	>=1500 kg-m				
g)	Absorbed Energy	>=40% of stored energy				

Note: The energy absorption capacity shall be calculated from the area under the load displacement characteristic curve drawn from pack height after three compressions to pack height of 313 mm. For calculating the absorbed energy the graph is drawn in reverse releasing the load from pack height of 313 mm and obtaining the area under the load displacement curve. The difference in energy as a percentage of stored energy is the absorbed energy.

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7.1.6 Test of Compression Strength after Clamping: (As per clause 5.2 of specification)

Sample Size: 1 packs for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual Sample:

a)	Free height (4 Buffer Element)	448 ± 4mm	
b)	Pre compression force at 423 mm height	750 kg<F<2000 Kg.	
c)	Compressive force at 398 mm height	1000 kg<F<4000 Kg.	
d)	Compressive force at 363 mm height	5000 kg<F<15000 Kg.	
e)	Compressive force at 313 mm height	50000 kg<F<100000 Kg.	
f)	Stored energy	>=1500 kgm	
g)	Absorbed Energy	>=40% of stored energy	

7.1.7 Endurance Test (As per clause 5.3 of specification)

Sample Size: 1 packs for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual Sample:

	Endurance Test	Specified Value	
a)	Stored energy in load range of 2t to 15 t	Shall not be less than 80% of the corresponding stored energy recorded during the compression strength after clamping.	
b)	Force required to obtain height of 423 mm	Shall not be less than 750 Kg.	

7.1.8 Impact Endurance Test (As per clause 5.4 of specification)

(Free fall of 1000 kg load from a height of 1 Mtrs. 500 blows)

Sample Size: 1 packs for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual Sample:

	Endurance Test	Specified Value	
a)	Capacity when measured after half an hour	Shall not be less than 85% of the capacity recorded under clause 4.0 of spec.	
b)	Visual examination	No bond failure	

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7.1.9 Compression Set (After 25% compression for 24 hrs. at 70 °C)

Sample Size: 1 pack for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual Sample:

Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness before ageing(mm)	6.0-6.6 mm						
Spacer Thickness (mm)	4.69-4.71 mm						
Thickness after ageing (mm)							
Compression Set	30% (max.)						
Avg Compression Set							
Parameters	Permissible Limit	1			2		
		a	b	c	a	b	c
Thickness before ageing(mm)	6.0-6.6 mm						
Spacer Thickness (mm)	4.69-4.71 mm						
Thickness after ageing (mm)							
Compression Set	30% (max.)						
Avg Compression Set							

7.1.10 Specific Gravity

Sample size: 1 pack for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual sample:

Parameters	Specified Value	1	2	3	4
Specific Gravity	Value of SG shall be maintained as mentioned in approved QAP of the firm in regular manufacture and tolerance of ± 0.05 over the SG of the prototype formulation.				

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7.1.11 Ash Content

Sample size: 1 pack for the lot of 500 packs / 2 packs for the lot of more than 500 packs

Actual sample:

Parameters	Specified Value	1	2	3	4
Ash Content	5% Max				

7.1.12 Marking: As per para 8 of Spec. **OK/NOT OK**

7.1.13 Packing: As per para 9 of Spec. **OK/NOT OK**

7.1.14 Storage: As per para 10 of Spec. **OK/NOT OK**

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