



QM-C-7.1/Spring/0002

Inspection Plan(Check Sheet)

Item: Suspension Coil Springs for Coaching & Freight Stock
Specn. : WD-01-HLS-1994, Rev.3 of Jan'2009
Amd.:
Drg. No. & Alt.:

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

6. Date of offering for inspection.

7. Consignee

8. Delivery Period

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SUMMARY OF RESULT
Lot size 1000 nos.

(A) Periodical / Intermediate check :

S.No.	Name of Test	Specified	Last test done	Next test due
1.	Fatigue Test	As per clause 6.0 of Specm.No.WD-01-HLS-1994 (Rev.3)		

(B) Routine Check :

* (Routine check shall be conducted after ensuring the Periodical / Intermediate check is not over due)

Sr No.	Parameters	Specified Value								Observation	
										Max.	Min.
1	Visual Check										
2	Stamping	As per drawing									
3	Dimensional check	As per drawing									
4	Pitch Uniformity	As per specification									
5	Squareness	As per drawing/specification									
6	Parallelism	As per drawing/specification									
7	End preparation	As per drawing/specification									
8	Scragging	No permanent set									
9	Spring stiffness	As per drawing									
10	Static load testing	As per drawing									
12	Spacing between two active coil	As per drawing									
12	Pitch uniformity	As per specification									
13	Shot peening	As per specification									
14	Core hardness	As per drawing/specification									
15	Surface hardness	As per drawing/specification									
16	Diff. Bet.core and surface hardness	20 BHN (Surface hardness should be more than core hardness)									
17		C	Si	Mn	S (max)	P (max)	Cr	V	Mo		
18	60Si7	0.55-0.65	1.5-2.0	0.80-1.0	0.025	0.025	--	--			
19	52Cr ₄ Mo ₂ V	0.48-0.56	0.15-0.4	0.70-1.1	0.025	0.025	0.90-1.2	0.07-0.12	0.15-0.25		
21	Depth of decarb	0.5% of nominal bar dia									
22	Grain size	6 or finer									
23	Inclusion	Not worse than 1.5 ABCD for thin series and 1.0 ABCD for thick series									
24	Macro etching	Not worse than C2R2S2 of ASTM 381 Plate Ist									
25	Paint quality	As per drawing/specification									
26	Colour coating	As per drawing									

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Sr. No.		Actual sample	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20
1	Spring Surface	100% Springs																				
		2% after Shot peening																				
2	Stamping	5% or 20 springs whichever is less																				
3	Free Height																					
3.1	Bar Diameter																					
3.2	Outer Diameter																					
3.3	Inner Diameter																					
4	Squareness																					
5	Parallelism																					
6	End preparation																					
7	Tip thickness	5% or 20 springs whichever is less																				

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8 .Scragging:

Sample size – 5% or 20 springs whichever is less

Actual No of Sample-

Scragging load/height-

Sr. No	Height after one stroke (mm)	Height after 4 th stroke (mm)	Permanent set (mm)	Sr. No	Height after one stroke (mm)	Height after 4 th stroke (mm)	Permanent set (mm)
1.				11			
2.				12			
3.				13			
4.				14			
5.				15			
6.				16			
7.				17			
8.				18			
9.				19			
10.				20			



9. Spring Stiffness

Specified No. of Samples : 5% or 20 springs whichever is less

Actual No. of samples :

Load of 30% -

Load of 70% -

Specified Spring rate –

Sample No.	Load in Kg.			
	Height	Height at Load 30%	Height at Load 70%	Stiffness Kg/mm
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				



10 Static Load Test

Sample Size-5% or 20 springs whichever is less
 Actual No. of samples:

Sample		0	1	2	3	4	5	6
	<i>Load in tons.</i>							
	<i>Deflection</i>							
1	Height							
	Diff							
2	Height							
	Diff							
3	Height							
	Diff							
4	Height							
	Diff							
5	Height							
	Diff							
6	Height							
	Diff							
7	Height							
	Diff							
8	Height							
	Diff							
9	Height							
	Diff							
10	Height							
	Diff							
11	Height							
	Diff							
12	Height							
	Diff							
13	Height							
	Diff							
14	Height							
	Diff							
15	Height							
	Diff							
16	Height							
	Diff							
17	Height							
	Diff							



18	Height							
	Diff							
19	Height							
	Diff							
20	Height							
	Diff							

11. Maximum spacing between 2 acting coil under 85% deflection

Specified No. of Samples : 5% or 20 springs whichever is less

Actual No. of samples :

$$\text{Nominal Spacing} = \frac{\text{Free Height} - \text{Solid Height}}{\text{No. of active coils}} = x$$

Sr. no.	Free height (mm)	Solid Height	No. of active coils	Nominal Spacing (x)	Maximum spacing between 2 acting coil (A)	B= $\frac{Ax100}{X}$ (%)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						

Note : B should not be more than 40%.



C = Minimum space between two active coils

12	Pitch uniformity (C)	5% or 20 springs whichever is less	Actual Sample size												
13	Crack Detection		Actual Sample size												

14. Shot peening (Internal records must be checked)

15. Core Hardness :

Sample size – 1% or 3 springs whichever is less

Actual no. of samples-

Hardness Specified	60Si7	380-440 BHN	
	52Cr ₄ Mo ₂ V	415-460 BHN	

S No.	Dia of Indentation	Hardness
1.		
2.		
3.		



16. Surface Hardness :

Sample size –5% or 20 springs whichever is less

Actual no. of samples

Hardness Specified 60Si7 380-440 BHN
 52Cr₄Mo₂V 415-460 BHN

SN o.	Dia of Indentation		Hardness	SNo.	Dia of Indentation		Hardness
	1st	2nd			1st	2nd	
1				11			
2				12			
3				13			
4				14			
5				15			
6				16			
7				17			
8				18			
9				19			
10				20			

16.1 Variation between surface and core hardness -

Samples size – 1% or 3 Springs whichever is less

Actual no. of Samples:

Specified Value - 20 BHN (Surface hardness should be more than core hardness)

Sample	1				2				3			
	I	II	Av	BHN	I	II	Av	BHN	I	II	Av	BHN
Surface												
Core												
Variation												

17. Chemical Compositions -

Sample size - 1% or 3 springs whichever is less

Actual No. of Samples-

No.	Specified Value	C	Mn	Si	S (max)	P(Max)	Cr	V	Mo
	60 Si 7	0.55 to 0.65	0.8 to 1.0	1.5 to 2.0	0.025	0.025	--	--	--
	52Cr ₄ Mo ₂ V	0.48 to 0.56	0.7 to 1.1	0.15 to 0.40	0.025	0.025	0.9 to 1.2	0.07 to 0.12	0.15 to 0.25
1	Value observed								
2									
3									



18 & 19. Metallurgical –(Depth of decarb & Grain size)

Sample Size - 1% or 3 springs whichever is less
 Actual No. of Samples-

Sample No.	Depth of Decarb	Grain Size
Specified value	0.5% of the nominal bar dia	ASTM no.6 or finer
1		
2		
3		

20. Inclusion Rating-

Sample size – 1% or 3 springs whichever is less
 Actual No. of Samples-
 Specified Value – Not worse than 1.5 A B C D for thin series and 1.0 A B C D for thick series.

Sample	A		B		C		D	
	Thin	Thick	Thin	Thick	Thin	Thick	Thin	Thick
1								
2								
3								

21. Macro Etching-

Sample size – 1% or 3 springs whichever is less
 Actual No. of Samples-
 Specified Value-C2, R2, S2 max.

Sample No.	Macro Etch level		
	C	R	S
1			
2			
3			

22	Paint Quality	5% of springs																				
23	Grouping & color coding	5% of springs																				



24. Fatigue testing

(As per clause 6of specification)

It is to be done in first lot of each type of spring supplied in every alternate year.

1. Fatigue testing previously done for this spring..... Yes/no
If no, then the following procedure is to be followed:
2. Fatigue testing is to be done for this lot:..... Yes/no
If yes, then the following procedure is to be followed:
3. Particulars of spring before fatigue testing:-
 - a) Free height =.....mm
 - b) Solid height =.....mm
 - c) Static deflection = (Free ht. – Working height.) =.....mm
 - d) Static (working) height =.....mm
 - e) Load at static height =.....kg
4. Particulars of spring during fatigue testing:-
 - a) Frequency of test (not<2H_z) = H_z
 - b) Stroke (Static height ± 30% of static deflection) mm
 - c) Static height measurement (on static load):-

Measurement Cycle	Load at Static height kg (e)	Static Height (mm)
2,50,000		
5,00,000		
7,50,000		
10,00,000		
12,50,000		
15,00,000		
17,50,000		

5. Particulars of spring after fatigue testing :- (After 2 million cycle)
 - a) Free height =.....mm
 - b) Solid height =.....mm
 - c) Static deflection = (Free ht. – Working height.) =.....mm
 - d) Static (working) height =.....mm
 - e) Load at static height =.....kg
6. Actual load verses height graph from free to static height and free to solid height for both (before and after fatigue testing) is to be plotted.
7. Magna flux testing after fatigue is to be done – crack detected/not detected.
8. Failure of spring during fatigue testing observed:- Yes/No
If yes, full details are to be given.

Note : In case the fatigue test has not been done so fatigue test is required to be done at “FIRST”