



QM-C-7.1/SPRING/0008
Inspection Plan(Check Sheet)

Item : **Spring- Single coil for EMD Locomotives**
Specn. :
Amd. :
Drg. No. & Alt. No. : EMD part No. 40075318/DLW Part no. 17410060/RDSO Drg SK.VL-750 Alt.1 and EMD part No. 40090911/DLW Part no. 1741010/RDSO Drg No. SK.VL-751 and DLW Part no.17410137/RDSO Drg No. SKVL-755

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 :

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



SUMMARY OF RESULT
Lot size 500 nos.

Sr No.	Parameters		Specified Value					Observation		
								Max.	Min.	
1	Spring surface									
2	Stamping		As per para 6.1.4							
3	Dimensional check		As per para 6.1.7							
4	Squareness		As per para 6.1.6							
5	Parallelism		As per para 6.1.6							
6	End preparation		As per para 6.1.6							
7	Tip thickness		As per para 6.1.6							
8	Scragging		No permanent set							
9	Permanent set		As per para 6.1.7(e)							
10	Length of contact area b/w Inactive & active coil at working load		As per para 6.1.6							
11	Static load test stiffness		As per drawing							
12	Working height		As per para 6.1.7(c)							
13	Max. spacing between two adjacent active coil under 85% deflection		As per para 6.1.7(d)							
14	Pitch uniformity		As per para 6.1.7(d)							
15	Crack detection		As per para 6.1.3							
16	Shot peening		As per para 6.1.3							
17	Depth of decarb		As per para 6.1.3							
18	Surface hardness		As per para 6.1.3							
18.1	Core hardness		As per para 6.1.3							
	Variation b/w surface & core hardness		20 BHN							
19	SAE/AI SI Grade 8650H	C	Si	Mn	S(Max)	P(Max)	Cr	Ni	Mo	
		0.47-0.54	0.15-0.30	0.70-1.05	0.040	0.035	0.35-0.65	0.35-0.70	0.15-0.25	
Observed Values										
20	Grain structure		As per para 6.1.3							
21	Powder coating		As per para 8							
22	Grouping & steel band coding		As per para 7							
23	Correlation of TCs with material received		As per para 6.1.2							
24	Manufacturing Process Used		As per para 6.1.2							
25	Marking on Bars		As per para 6.1.2							
26	Fatigue Testing		As per para 11							

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



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	10% or 20 springs whichever is less (Minimum 10 Nos. Spring)																				
3	Free Height																					
	Total no. of coils																					
3.1	Bar Diameter																					
3.2	Outer Diameter																					
3.3	Inner Diameter																					
4	Squareness																					
5	Parallelism																					
6	End preparation																					
7	Tip thickness		10% or 20 springs whichever is less																			

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



8 & 9. Scragging & permanent set

Sample size – 10% or 20 Nos. whichever is less (Minimum 10 no. spring)

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.			

10. Length of contact area b/w Inactive & active coil at working load

Specified No. of Samples: 10% or 20 Nos. whichever is less (Minimum 10 no. spring)

Actual No. of samples-

Specified length-

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
11.	12.	13.	14.	15.	16.	17.	18.	19.	20.

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



11. Static load test stiffness

Specified No. of Samples: 10% or 20 Nos. whichever is less (Minimum 10 no. spring)

Actual No. of samples:

Load of 30% -

Specified spring rate –

Load of 70% -

WDG4:38.7 kg per mm for WDG4 Locomotives

WDP4:29.4 kg per mm for WDP4 Locomotives

WDG4D: 30.67 kg per mm for WDG4D Locomotives

Tolerance $\pm 5\%$

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.				

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



12. Working height (Static Load Test)

Sample Size- 10% or 20 Nos. whichever is less (Minimum 10 no. spring)

Actual No. of samples: Specified Working Height: 435mm for WDG4 & WDP4 locomotive
and 434 mm for WDG4D locomotive

Sample	1	2	3	4	5	6	7	8	9	10
<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									

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



18	Height										
	Diff										
19	Height										
	Diff										
20	Height										

13 Maximum spacing between 2 acting coil under 85% deflection

Specified No. of Samples: 10% or 20 Nos. whichever is less (Minimum 10 Nos. Spring)

Actual No. of samples:

Nominal Spacing = Free Height – Solid Height / 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)	$B = \frac{A \times 100}{X}$ (%)
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%

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



14	Pitch uniformity	10% or 20 Nos. whichever is less(Mini mum 10 no. spring)	Actual Sample size										
15	Crack Detection	2% of lot or Min. 10 no. spring	Actual Sample size										

16. Shot peening (Internal records must be checked)

17. Metallurgical-Depth of Decarb:

Sample Size-2% or 2 Nos Min.

Sample No.	Depth of Decarb
Specified value	0.457 mm max.
1	
2	

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



18. Surface Hardness :

Sample size – 10% or 20 springs whichever is less (Min.10 Spring)

Actual no. of samples-

Surface Hardness Specified 415 - 461 BHN max.

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

18.1 Core hardness & Variation between surface and core hardness -

Sample size – 2% or 2 Nos Min. Whichever is less

Actual no. of Samples:

Specified Value – 20 BHN Max.

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

19. Chemical Compositions -

Sample size – 2% or 2 Nos Min. whichever is less

Actual No. of Samples-

No.	Specified Value	C	Mn	Si	S (max)	P(Max)	Cr	Ni	Mo
	SAE 8650H	0.47-0.54	0.70-1.05	0.15-0.30	0.040	0.035	0.35-0.65	0.35-0.70	0.15-0.25
1									
2									

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



20. Metallurgical – (Grain Structure)

Sample Size – 2% or 2 Nos Min. whichever is less

Specified value-Temper marten site

Actual No. of Samples-

Sample No.	Observation
1	
2	

21. Powder coating

Sample Size-10% or 20 Spring whichever is less (Min.10 springs)

Specified Value-The Powder coating shall be not less than80 micron min. inside & outside

Sample																				
Inside Value																				
Outside Value																				

22. Grouping & Colour coding

Sample Size-10% or 20 Spring whichever is less (Min.10 springs)

Specified Value-As per para 7

Sample																				
BLUE																				
GREEN																				
BROWN																				

23.	Correlation of TCs with material received	TC& Dispatch memo etc. should correspondence to heat Nos. of material received																		
24.	Manufacturing Process Used	Electric/Duplex/Combination of these process																		
25.	Marking on Bars	05 Nos or 10% of springs, whichever is less																		

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL



26. Fatigue testing (To be done in case of prototype or design change)
 (As per para 11 and EDPS-108)

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 height –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 (preferably done at 2Hz but not less than 1.5) =
 Hz
 - b) Stroke (Static height \pm 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 height. –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.

QC INCHARGE OF M/s

RDSO INSPECTING OFFICIAL