सत्यमेव जयते

Govt. of India
Ministry of Railways
Research Designs & Standards Organization
Manak Nagar, Lucknow-226011

QM-C-8.1/COUPLER/0019

Inspection Plan (Check Sheet)

FOR

UPGRADED HIGH CAPACITY DRAFT GEAR

TO RDSO SPECIFICATION NO.-WD-71-BD-15 (REV.-1)

(M/s Titagarh Wagons Limited; Unit – Titagarh Steels Limited, Kolkata)

Item			Upgraded High Capacity Draft Gear
Specification No.			WD-71-BD-15 (Rev.1)
01.	Firms Name		
02.	Date of Inspection		
03.	Contract details		
	a.	Contract No. and Date	
	b.	Order Placing authority	
	c.	Quantity on Order	
	d.	Quantity offered for inspection	
	e.	Date of offering for inspection	
	f.	Consignee	
	g.	Delivery Period	

Summary of Results

SN	Items Inspected	Observations
1.	Metallurgical & Chemical Properties of Housing	
2.	Draft Gear Assembly	
3.	DG Housing	
4.	30° Shoe	
5.	Wedge	
6.	Top Follower	
7.	Rear Wall Plate	
8.	Pre – Shortner	
9.	Bore Insert	
10.	Rubber Pad	
11.	Capacity	
12.	Production Testing	
13.	Status of QAP	
14.	Chemical of bought out components	

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INSPECTION CHECK SHEET

1. Inspection of Draft Gear & its components as per manufacturers approved QAP.
2. Visual Inspection : 100%

71 BD Draft Gear

SN	Components	Drawing No.	Remarks of inspecting official
1.	DG Housing	TWL/TSL/TDG-WD71/03.	
2.	Bore Insert	TWL/TSL/TDG-WD71/08.	
3.	Pre Shortner	TWL/TSL/TDG-WD71/40.	
4.	Shoe	TWL/TSL/TDG-WD71/05.	
5.	Wedge	TWL/TSL/TDG-WD71/04.	
6.	Top Follower	TWL/TSL/TDG-WD71/06.	
7.	Rear Wall plate	TWL/TSL/TDG-WD71/07.	
8.	Rubber Pad	TWL/TSL/TDG-WD71/09.	

3. Metallurgical & Chemical Testing of Draft Gear Housing: Each Heat

Heat No.								
Serial No.								

4. Chemical Testing (Each Heat)-
   Heat No.

S.No.	Parameter	Specified value	Observed value
1.	C%	0.30 – 0.35	
2.	Mn%	0.70 -1.00	
3.	Si%	0.35 – 0.80	
4.	S%	0.040 Max.	
5.	P%	0.040 Max.	
6.	Cr%	0.25 Max.	
7.	Mo%	0.25 Max.	
8.	Ni%	0.25 Max.	
9.	Al%	0.03 – 0.08	

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5. Mechanical & Metallurgical Properties /NDT : Each Heat

S.No.	Parameter	Specified value	Observed value
1.	UTS	95000 PSI	
2.	YS	65000 PSI	
3.	EL %	10	
4.	RA%	25	
5.	Imp.(-28.8°C)	20.4 J	
6.	Hardness	217 – 285 BHN	
7.	MICRO	Tempered Martensite	

6. Dimensions by gauging Assembly : (5%)

2.

SN	Draft Gear Assembly	Firm's gauge no.	Observations	
			Sample 1	Sample 2
1.	Assembled draft gear			
2.	Draft gear pre shortened length top (Go gauge)			
3.	Draft gear pre shortened length (No go gauge)			

7. Visual &Dimensions by gauging (DG housing) : (2%)

SN	DG Housing	Firm's gauge no.	Observations
1.	Visual Inspection		
2.	Housing box	TWL/TSL/TDG-WD-71/19.	
3.	Housing bore dia.(GO)	TWL/TSL/TDG-WD-71/12.	
4.	Housing bore dia. (NO GO)	TWL/TSL/TDG-WD-71/22.	
5.	Wedge to housing lug clearance	TWL/TSL/TDG-WD-71/10.	
6.	Cylinder Gauge	TWL/TSL/TDG-WD-71/20.	
7.	Cylinder width Gauge	TWL/TSL/TDG-WD-71/13.	
8.	Housing dim. Over hex. Flat	TWL/TSL/TDG-WD-71/14.	
9.	Inside housing width 7.25"	TWL/TSL/TDG-WD-71/16.	
10.	Inside housing width 11.5"	TWL/TSL/TDG-WD-71/15.	
11.	End wall thickness	TWL/TSL/TDG-WD-71/18.	
12.	Side wall thickness	TWL/TSL/TDG-WD-71/17.	
13.	Inside housing depth	TWL/TSL/TDG-WD-71/23.	
14.	Housing depth	TWL/TSL/TDG-WD-71/11.	
15.	Draft Gear Assembly With Pre shortner	TWL/TSL/TDG-WD-71/21	

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8. Shoe to Drawing No. TWL/TSL/TDG-WD71/05.

A) Inspection of Shoe:2%

SN	Wedge Shoe	Firm's gauge no.	Observations		
			Sample 1	Sample 2	Sample 3
1.	Visual				
2.	Shoe face (Max)	TWL/TSL/TDG-WD-71/34.			
3.	Shoe face (Min)	TWL/TSL/TDG-WD-71/35.			
4.	Shoe back angle & radius	TWL/TSL/TDG-WD-71/39			
5.	Outside width of shoe	TWL/TSL/TDG-WD-71/36.			
6.	Shoe thickness	TWL/TSL/TDG-WD-71/37.			
7.	Shoe back surface flatness	TWL/TSL/TDG-WD-71/38.			

B) Chemical & Mechanical:

S.No.	Parameter	Specified value	Observed value
1.	C%	0.35-0.40	
2.	Mn%	0.70-0.90	
3.	Si%	0.20-0.40	
4.	S%	0.040 Max.	
5.	P%	0.040 Max.	
6.	Cr%	0.80-1.10	
7.	Mo%	0.15-0.25	
8.	Hardness	444-495 BHN	
9.	Case Depth	1.5-2.0mm	

9. Wedge to Drawing No.-TWL/TSL/TDG-WD71/04.

A) Inspection of Wedge:2%

SN	Wedge	Firm's gauge no.	Observations
1.	Visual		
2.	Wedge Width Lug Depth	TWL/TSL/TDG-WD-71/30	
3.	Wedge top to top lug depth	TWL/TSL/TDG-WD-71/29	
4.	Wedge Inspection Gauge	TWL/TSL/TDG-WD-71/25	
5.	Wedge trim dia.	TWL/TSL/TDG-WD-71/31	
6.	30^0 wedge angle	TWL/TSL/TDG-WD-71/32	
7.	Wedge body length	TWL/TSL/TDG-WD-71/33	

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B) Chemical & Mechanical:

S.No.	Parameter	Specified value	Observed value
1.	C%	0.28-0.34	
2.	Mn%	0.60-0.90	
3.	Si%	0.20-0.40	
4.	S%	0.040 Max.	
5.	P%	0.040 Max.	
8.	Hardness	555-683 BHN	
9.	Case Depth	1.5-2.0mm	

10. Top Follower to Drawing No.-TWL/TSL/TDG-WD71/06

A) Inspection of Top Follower :2%

SN	Top Follower	Firm's gauge no.	Observations
1.	Visual Inspection		
2.	Top follower bottom flatness	TWL/TSL/TDG-WD-71/27	
3.	Top follower thickness	TWL/TSL/TDG-WD-71/24	
4.	Over all follower thickness	TWL/TSL/TDG-WD-71/26	
5.	Follower thickness (Bottom flange)	TWL/TSL/TDG-WD-71/28	

B) Chemical & Mechanical:

S.No.	Parameter	Specified value	Observed value
	UMS G-15360 (AISI-1536)		
1.	C%	0.36-0.44	
2.	Mn%	1.35-1.65	
3.	Si%	0.20-0.40	
3.	S%	0.040 Max.	
4.	P%	0.040 Max.	
5.	Hardness	277-331 BHN	

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11. Dimensions by gauging Rear Wall Plate : 2%

SN	Rear wall plate	Firm's gauge no.	Observations
1.	Visual Inspection		
2.	Rear wall plate thickness	TWL/TSL/TDG-WD-71/42	
3.	Rear wall plate width & Length	TWL/TSL/TDG-WD-71/43	
4.	Rear wall plate Angle Gauge	TWL/TSL/TDG-WD-71/44	

12. Pre-shortner to drawing no.-TWL/TSL/TDG-WD71/40.

SN	Parameter	As per Drg./Test Certificate	Observations
1	Visual Inspection		
2	Crushing Strength	26.57-33.66 Kg/mm²	

13. Bore Insert to drawing no. : TWL/TSL/TDG-WD71/08. :2%

SN	Parameter	Observations
1.	Visual Inspection	

14. Elastomer Units (Rubber Pad) to Drawing No.TWL/TSL/TDG-WD71/09. to be measured after dismantling : 2%

SN	Item	Direct Measurement	Observations
1.	Elastomer Unit (Rubber Pad)		

Physical Values:

Sample Size								
S. No.	Parameter	Specified	Observation					
			1	2	3	4	5	6
1.	Visual Inspection	Free from mould defect						
2.	Dimension	Free height =67.2mm						
		Length of pad = 286 ±0.6mm						
		Width of pad = 181 ± 0.6mm						
3.	Hardness (As per TC)	70-80 Shore A						
4.	Tensile Strength (As per TC)	150 Kg/cm²Min.						
7.	Compression Set (As per TC)	30% Max.						

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15. Capacity & other tests Sample size – one assembly

The following tests have to be carried out once in six month by inspecting official

SN	Tests	Last test done on	Remarks
1.	Capacity test		
2.	Sturdiness test		
3.	Sticking		
4.	Uniformity of action		

If due, conduct tests and attach results

16. Production Testing

i) Ensure that at least 5 draft gears out of every 500 draft gear or part thereof have been witnessed by inspecting authority for minimum capacity requirements during production of draft gears being offered for final inspection. The test shall consist of minimum numbers of blows required to produce the minimum capacity required. If any unacceptable gear found, this will be necessitate the testing of the next 50 untested gears to 100% capacity. If any defective gears found within that 50 then 100% capacity testing shall be continued until 50 consecutive gears have been tested without failure.

17. Capacity test Results:

SN	Draft Gear Heat no. & SL no.	Capacity obtained in tup hammer test (Min. Capacity 45,000 ft. – lb)
1.		
2.		
3.		
4.		
5.		

ii) Check all the test results of the tests conducted at different stages by manufacturer.

iii) Capacity test shall be done as per para 8.0 of AAR M – 901 E. Start with 9” free fall for testing in buff. Continue with selected increment not to exceed 2”. In order to pass the test the draft gear must develop 45,000 ft – lb capacity in buff.

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CAST STEEL FRONT FOLLOWER (Y46AE)

A. CHEMICAL COMPOSITION

S.No.	Parameter	Specified value	Observed value					
1.	C%	0.28-0.33						
2.	Mn%	0.60-0.90						
3.	Si%	0.40-0.60						
4.	S%	0.030 Max.						
5.	P%	0.030 Max.						
6.	Cr%	0.50-0.80						
7.	Mo%	0.15-0.25						
8.	Ni%	0.50-0.60						
9.	AI%	0.02-0.05						

B. PHYSICAL PROPERTIES

S.No.	Mechanical Properties	Specified value	Observed value					
1.	Tensile Strength	84.40 Kg/mm²						
2.	YS	70.30 Kg/mm²						
3.	Elongation	14%						
4.	RA	30%						
5.	Impact	34.32J (Min. at -40°C)						
6.	Hardness	241-311 BHN						
7.	Micro	Tempered Martensite						

C. Gauge

SN	Rear wall plate	Firm's gauge no.	Observations
1.	Visual Inspection		
2.	Profile Gauge	TWL/TSL/TDG-WD71/46	
3.	Thickness Gauge	TWL/TSL/TDG-WD71/47	

18. Dimension Check: 5% or Min. 5 Nos.

Checked As per drawing gauging (all dimension are in mm)

Sample No.	Length 317.5 +1.58/-3.17	Width 228.6 +0/-3.17	Thickness 57.15 +2.38/-0.00

19. Painting:

Specified (Para 8.0 of STR)	Observation
Firozi paint on only exposed surface excluding working positions.	

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