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

सत्यमेव जयते

QM-C-8.1/COUPLER/0021

Inspection Plan (Check Sheet)

M/S KHARAGPUR METAL REFORMING INDUSTRIES PVT LTD

KHARAGPUR, PASCHIM MIDNAPORE, WEST BENGAL

Item: **Upgraded High-Capacity Draft Gear (KM-400)**
Specification No: **RDSO Specification WD-71-BD-15 (Rev.01)**

Amendment:
Drawing No. & Alteration No.:

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1. Firm's Name:

2. Date (Period) of Inspection:

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)

3. Quantity on Order:

4. Quantity offered for inspection:

5. Date of offering for inspection:

6. Consignee:

7. Delivery Period:

Signature of Firm Representative **Signature of Inspecting Official of RDSO**

Summary of Results

Sl.NO.	Items inspected	Observations
1	Metallurgical & Chemical Properties of Housing & Front Follower	
2	Draft Gear Assembly	
3	DG Housing	
4	30^0 Shoe	
5	Wedge	
6	Top Follower	
7	Bore insert	
8	Pre-shortener	
9	Rubber pads	
10	Capacity	
11	Production Testing	
12	Status of QAP	
13	Chemical of bought out components	
14	Record of annual Type test	

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INSPECTION CHECK SHEET

Lot size - 50 nos.
Sample size-2 Nos.

Manufacturing & Inspection of Upgraded High-capacity Draft Gear & its components as per WD-71-BD-15 (Rev.1) and manufacturer's approved QAP.

1. Visual inspection: Sample size: 100%

Draft Gear Assembly (KM-400)

Sl. No	Components	Remarks of RDSO Inspecting Official
1	Draft Gear Housing	
2	Draft Gear Follower	
3	Top Follower	
4	Wedge	
5	Shoe	
6	Pre-shortener	
7	Bore insert	
8	Rubber pads	

2. Metallurgical & Chemical Testing of Draft Gear Housing (Each Heat)

Heat No.					
Serial No.					

3. Spectro Analysis (Housing) (Each Heat)

Sl. No.	Parameter (Housing)	Specified value (as per approved QAP)	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	Al%	0.020-0.050					

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4. Mechanical & Metallurgical Properties (Housing) (Each heat)

Sl. No.	Parameter	Specified value (as per approved QAP)	Observed value				
			Heat No.	Heat No.	Heat No.	Heat No.	Heat No.
1	UTS	825 N/mm² (min)					
2	YS	690 N/mm² (min)					
3	EL%	14% (min)					
4	RA%	30% (min)					
5	Impact	34.31 Joule at (-40°C) (min)					
6	Hardness	241-311 BHN					
7	Microstructure	Tempered Martensite					

5. Spectro Analysis (Cast Follower) (Each heat)

Sl. No.	Parameter (Housing)	Specified value (As per approved QAP)	Observed value				
			Heat No.	Heat No.	Heat No.	Heat No.	Heat No.
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. Mechanical & Metallurgical Properties (Cast Follower) (Each heat)

Sl. No.	Parameter	Specified value (As per approved QAP)	Observed value				
			Heat No.	Heat No.	Heat No.	Heat No.	Heat No.
1	UTS	825 N/mm² (min)					
2	YS	690 N/mm² (min)					
3	EL%	14% (min)					
4	RA%	30% (min)					
5	Impact	34.31 Joule at (-40°C) (min)					
6	Hardness	241-311 BHN					

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7. Dimensions by gauging (Assembly)

Sample – (2 in 50 or).

Heat No. & Serial no:

Sl. No	Draft Gear Assembly (For standard 625.5mm. (24 5/8") pocket.)	Firms Gauge no. (For standard 625.5mm. (24 5/8") pocket.)	Observations	
			Sample 1	Sample 2
1	Draft Gear pre shortened length (Go-Gauge)	KMRI/400/DG/9/01/01		
2	Housing Box Gauge	KMRI/400/DG/1/01/18		

8. Dimensions by gauging (Draft Gear Housing) to be measured after disassembly

Sample – (2 in 50)

Heat No. & Serial No.

Sl. No	Housing (list of Gauge as per approved QAP)	SKETCH NO. /DRG. NO. (as per approved QAP)	Observations
1	Cylinder Bore Diameter Gauge (Attop of Cylinder)	KMRI/400/DG/1/02/18	
2	Cylinder Depth Gauge (UnderCylinder lug)	KMRI/400/DG/1/12/18	
3	Inside Cylinder Depth Gauge	KMRI/400/DG/1/13/18	
4	Wedge to Cylinder Lug ClearanceGauge	KMRI/400/DG/1/04/18	
5	Cylinder Bore Diameter Gauge (AtCrown of Bore)	KMRI/400/DG/1/09/18	
6	Inside Tapered Bottom Gauge	KMRI/400/DG/1/11/18	
7	Cylinder Rim Top Offset Gauge	KMRI/400/DG/1/10/18	
8	Pad Insert Opening Gauge	KMRI/400/DG/1/16/18	
9	Inside Cylinder Length BelowShoulder Gauge	KMRI/400/DG/1/17/18	
10	Cylinder Depth Gauge	KMRI/400/DG/1/05/18	
11	Cylinder Width Gauge	KMRI/400/DG/1/06/18	
12	Inside Cylinder Base FlatnessGauge	KMRI/400/DG/1/18/18	
13	Housing Dimension Over Hex.Flatness Gauge.	KMRI/400/DG/1/07/18	
14	118° Bore Face Angle Gauge	KMRI/400/DG/1/14/18	
15	122° Bore Face Angle Gauge	KMRI/400/DG/1/15/18	
16	Housing Base Flatness Gauge-2	KMRI/400/DG/1/08/18	
17	Cylinder Base Flatness Gauge-1	KMRI/400/DG/1/03/18	

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9. Dimensions by gauging (Cast Follower):

Sample size – two per lot

Sl. No	CAST FOLLOWER (as per Y46AE)	SKETCH NO./ DRG NO.	Observations
1	Gauge for Length	KMRI/FF/01/01/01	
2	Gauge for Width	KMRI/FF/01/01/02	
3	Gauge for Height	KMRI/FF/01/01/03	
4	Gauge for Thickness	KMRI/FF/01/01/04	

*Note: Gauges should be validated with AAR Catalogue No. Y46AE.

10. Painting: (Draft Gear)

Painting: Sample Size-100% As per Clause 8 of Spec.WD-71-BD-15 (Rev.1) Specified	OK/ Not OK
Firozi paint on only exposed surfaces excluding working portions	

11. Painting: (Cast Follower)

Painting: Sample Size-100% % As per Clause 8 of Spec.WD-71-BD-15 (Rev.1) Specified	OK/ Not OK
Firozi paint on only exposed surfaces excluding working portions	

12. Visual Test: (Sample Size -100%) As per Clause 8.4 of Spec.WD-70-BD-10(Rev.4)

Draft Gear Housing

Specified	Observed
No cracks, hot tears, cold shuts & weld cracks and surface condition as per Clause No. 7.1 of Spec. No. MES-1.7 M	

13. Visual Test: (Sample Size -100%) As per Clause 8.4 of Spec.WD-70-BD-10(Rev.4)

Cast Follower

Specified	Observed
No cracks, hot tears, cold shuts & weld cracks and surface condition as per Clause No. 7.1 of Spec. No. MES-1.7 M	

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14. Hardness:(Sample Size -10% of the lot) As per Clause 8.3 of Spec.WD-70-BD-10 (Rev.4)

Draft Gear Housing

Specified	Observed								
Serial No									
241-311 BHN									

15. Hardness:(Sample Size -10% of the lot) As per Clause 8.3 of Spec.WD-70-BD-10 (Rev.4)

Cast Follower

Specified	Observed								
Serial No									
241-311 BHN									

16. Dimensions by gauging (30'Shoe) to be measured after disassembly

Sample size - Two assembly

SL. No	30'Shoe	DRG. NO.	Observations		
1	Shoe Back Angle and Radius Gauge	KMRI /400/DG /4/03/07			
2	Outside Width of Show Gauge	KMRI /400/DG /4/04/07			
3	Shoe Face Gauge (Min)	KMRI /400/DG /4/01/07			
4	Shoe Face Gauge (Max)	KMRI /400/DG /4/02/07			
5	Shoe Face Crown Gauge	KMRI /400/DG /4/05/07			
6	30^0 Shoe Thickness Gauge	KMRI /400/DG /4/06/07			
7	Shoe Back Surface Flatness Gauge	KMRI /400/DG /4/07/07			

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17. Dimensions by gauging (Rubber Pads) to be measured after

Disassembly Sample size – two assembly

Sl. No	Rubber Pads	Dimensions	Observations					
1	Free height	67.18 mm						
2	Length of Pad	286±0.08 mm						
3	Width of Pad	181±0.8 mm						

18. Dimensions by gauging (Wedge) to be measured after

disassembly Sample size - two assembly

Sl. No	Wedge	DRG. NO.	Observations
1	Wedge Lug Depth Gauge	KMRI /400/DG /3/01/07	
2	Wedge Top to Top of Lug Depth Gauge (Min.)	KMRI /400/DG /3/02/07	
3	Wedge Top to Top of Lug Depth Gauge (Max.)	KMRI /400/DG /3/03/07	
4	Wedge Lug Width Gauge	KMRI /400/DG /3/04/07	
5	Wedge Gauge Dia. Over Outside of Wedge After Trim and Dia. Over Outside of Lugs	KMRI /400/DG /3/05/07	
6	Wedge Angle Gauge	KMRI /400/DG /3/06/07	
7	Gauge For Length of Wedge Body	KMRI /400/DG /3/07/07	

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19. Dimensions by gauging (Top Follower) to be measured after Disassembly Sample size - Two assembly

Sl. No	TOP FOLLOWER	DRG. NO.	Observations
1	Inner Follower Outside Contour Gauge	KMRI /400/DG /2/03/06	
2	Inner Follower Thickness Gauge for Bottom Flange	KMRI /400/DG /2/06/06	
3	Inner Follower Thickness Gauge	KMRI /400/DG /2/04/06	
4	Inner Follower Overall Thickness Gauge	KMRI /400/DG /2/05/06	
5	Inner Follower Bottom Flatness Gauge	KMRI /400/DG /2/02/06	
6	Inner Follower Radius Gauge	KMRI /400/DG /2/01/06	

20. Dimensions (Bore Insert) to be measured after disassembly

Sample size - Two assembly

SL. No	Bore Insert	Dimensions	Observations		
1	Length	104.8 (+0.8, -1.6) mm			
2	Width	54 ± 0.50 mm			
3	Thickness	6.4 ± 0.40 mm			

21. Dimensions (Pre-shortener) to be measured after disassembly

Sample size - Two assembly

SL. No	Pre-shortener	Dimensions	Observations		
1	Width	18.3 (+ 0.04 /-0.00) mm			

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22. Official Capacity test Results. (2 draft gears out of every 100 draft gear or part thereof)

SL. No.	Draft gear Casting Serial no. & Heat no.	Capacity obtained in Tup hammer test (Min. Capacity 45000 ft.lb)

23. Tup Hammer Test (Capacity & other tests) Sample size – one assembly

The following test has to be carried out once in six months by inspecting official

SN	Type of Tests	Last test done on	Observed Value
1.	Travel & Official capacity Test As per Clause No. 1.0 & 2.0 Annexure-1 of Spec. No. WD-71-BD-15		
2.	Endurance Test As per Clause No. 3.0 Annexure-1 of Spec. No. WD-71-BD-15		
3	Sturdiness test as per Clause No. 4.0 Annexure-1 of Spec. No. WD-71-BD-15		

24. Detail of annual type test as per specification:

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25. Production Testing:

(i) Check all the test results of the tests conducted at different stages by manufacturer.
(ii) The Draft gear Manufacturer shall conduct the official capacity test (as defined in clause 2 of Annexure-1) Of 5% of Purchase Order or 5in 100 whichever is higher and maintain as a Part of its internal records.
(iii) The Inspecting Authority shall audit check the QAP records of manufacturer to ensure that Draft gear components are manufactured as per QAP of the manufacturer and meets the Requirements of dimensions, chemical properties, and mechanical properties as laid down in QAP.
(iv) It should be possible for Inspecting Authority to find out QAP test/inspection records of draft Gear Components with serial no. cast on draft gear housing. On failure to meet this Requirement, whole lot shall be rejected.
(v) Two draft gear shall be selected by the Inspecting authority from a lot of not less than Fifty (50) draft gears. They shall be measured both in assembled and in disassembled condition. The Dimensions shall be checked with gauges which should be in conformity with Manufacturers Approved drawings.
(vi) At least 2 draft gears out of every 100 draft gear or part thereof shall be shall be drop- hammer Tested to in Presence of Inspecting Authority to ensure minimum capacity of the specification under which it has been approved. The test shall consist of the minimum number of blows required to produce the minimum capacity required. lf any unacceptable gears are found, this will necessitate testing of the next 50 untested gears to 100% capacity. lf any defective gears are found within that 50,100% capacity testing shall be continued until 50 consecutive gears have been tested without failure.
(vii) Draft gear follower (if Grade ‘E’ cast steel) shall be tested for Chemical composition, Mechanical Properties, Impact Test, Hardness and Dimensions as per procedure given in RDSO specification for Up gradation High tensile CBC No. WD-70-BD-10(Rev-2) or latest. Draft Gear follower (if rolled steel) shall be test. General requirement of casting acceptance, Marking, Weight variation tested for material heat treatment and hardness as given in AAR S-119'

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