



QM-C-8.1/COUPLER/0018

Inspection Plan (Check Sheet)

M/s Bhilai Engineering Corporation Ltd.

(Foundry Division Bhilai)

Item: Upgraded High Capacity Draft Gear (BEC-71)

Specn. : WD-71-BD-15

Amd. : REV: 01

Drg. No.& Alt. : WD-81010-S-03 (latest alt.)

1. Firms 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



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Summary of Results

S.NO.	Items inspected	Specified value	Observations
1	Metallurgical & Chemical Properties of Housing & Front Follower	As per check sheet	
2	Draft Gear Assembly	Gauging	
3	DG Housing	Gauging	
4	30° Shoe	Gauging	
5	Wedge	Gauging	
6	Top Follower	Gauging	
7	Bore insert	Gauging	
8	Pre-shortener	Gauging	
9	Rubber pads	Verify challan	
10	Capacity	Last test done on	
11	Production Testing	Verify from records	
12	Status of QAP	Verify from records	
13	Chemical of bought out components	Verify from TC	

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INSPECTION CHECK SHEET

Lot size - 50 nos. Max.

Sample size-2 nos.

1. Manufacturing & Inspection of Upgraded High capacity Draft Gear & its components
As per manufacturer's approved QAP.
2. Visual inspection
Sample size: One assembly

Draft Gear (BEC-71)

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

3. Metallurgical & Chemical Testing of Draft Gear Housing (BEC-71)

Heat No.	
Serial No.	

4. Spectro Analysis

S.No.	Parameter (HOUSING)	Specified value	Observed value	
1	C%	0.32 Max		
2	Mn%	1.85 Max		
3	Si%	1.50 Max		
4	S%	0.040 Max		
5	P%	0.040 Max		

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5. Spectro Analysis

S.No.	Parameter (CAST FOLLOWER)	Specified value	Observed value
1	C%	0.32 Max	
2	Mn%	1.85 Max	
3	Si%	1.50 Max	
4	S%	0.040 Max	
5	P%	0.040 Max	

6. Mechanical & Metallurgical Properties (HOUSING)

S.No.	Parameter	Specified value	Observed value
1	UTS	120 Ksi (827.37 Mpa) Min	
2	YS	100 Ksi (689.47 Mpa) Min	
3	EL%	14 % (Min.)	
4	RA%	30 % (Min.)	
5	Imp.	20 ft-lb at -40°F (27.12 J at 40°C) Min	-
6	Hardness	241 - 311 BHN	

7. Mechanical & Metallurgical Properties (CAST FOLLOWER)

S.No.	Parameter	Specified value	Observed value
1	UTS	120 Ksi (827.37 Mpa) Min	
2	YS	100 Ksi (689.47 Mpa) Min	
3	EL%	14 % (Min.)	
4	RA%	30 % (Min.)	
5	Imp.	20 ft-lb at -40°F (27.12 J at 40°C) Min	-
6	Hardness	241 - 311 BHN	

8. Dimensions by gauging (Assembly) (BEC-71)

Sample - Two no.

Heat No. & Serial No.1.

2.

S.No	Draft Gear Assembly	Firm Gauge no.	Observations	
			Sample 1	Sample 2
1	Assembly Draft Gear	BEC/METHOD/DEV-06/2018		
2	Draft Gear pre shortened length top (Go Gauge)	BEC/METHOD/DEV-07/2018		

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9. Dimensions by gauging (Housing) to be measured after disassembly

Sample –One assembly

(BEC-71) Draft Gear

Heat No. & Serial No.

S.No	Housing	SKETCH NO. / DRG. NO.	Observations
1	Housing Box Gauge	BEC/DG-71/G-1/17	
2	Cylinder Bore Diameter Gauge (At top of Cylinder)	BEC/DG-71/G-2/17	
3	Cylinder Depth Gauge (Under Cylinder lug)	BEC/DG-71/G-3/17	
4	Inside Cylinder Depth Gauge	BEC/DG-71/G-4/17	
5	Wedge to Cylinder Lug Clearance Gauge	BEC/DG-71/G-5/17	
6	Cylinder Bore Diameter Gauge (At Crown of Bore)	BEC/DG-71/G-6/17	
7	Inside Tapered Bottom Gauge	BEC/DG-71/G-7/17	
8	Cylinder Rim Top Offset Gauge	BEC/DG-71/G-8/17	
9	Pad Insert Opening Gauge	BEC/DG-71/G-9/17	
10	Inside Cylinder Length Below Shoulder Gauge	BEC/DG-71/G-10/17	
11	Cylinder Depth Gauge	BEC/DG-71/G-11/17	
12	Cylinder Width Gauge	BEC/DG-71/G-12/17	
13	Inside Cylinder Base Flatness Gauge	BEC/DG-71/G-13/17	
14	Housing Dimension Over Hex. Flates Gauge	BEC/DG-71/G-14/17	
15	118° Bore Face Angle Gauge	BEC/DG-71/G-15/17	
16	122° Bore Face Angle Gauge	BEC/DG-71/G-16/17	
17	Housing Base Flatness Gauge	BEC/DG-71/G-17/17	
18	Housing Base Flatness Gauge	BEC/DG-71/G-18/17	

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10. Dimensions by gauging (CAST FOLLOWER) to be measured after

Disassembly Sample size - one assembly

(BEC-71) Draft Gear

S.No	CAST FOLLOWER	SKETCH NO. / DRG. NO.	Observations
1	Gauge for Length	BEC / METHOD / DEV - 05/2018	
2	Gauge for Width	BEC / METHOD / DEV - 05/2018	
3	Gauge for Height	BEC / METHOD / DEV - 05/2018	
4	Gauge for Thickness	BEC / METHOD / DEV - 05/2018	
5	Gauge for Outside contour Gauge	BEC / METHOD / DEV - 05/2018	

11. Dimensions by gauging (30°Shoe) to be measured after disassembly

Sample size - one assembly

(BEC-71) Draft Gear

S.No	30°Shoe	SKETCH NO. / DRG. NO.	Observations
1	Shoe Back Angle And Radius Gauge	BEC/DG-71/G-19/17	
2	Outside Width Of Show Gauge	BEC/DG-71/G-20/17	
3	Shoe Face Gauge	BEC/DG-71/G-21/17	
4	Shoe Face Gauge	BEC/DG-71/G-22/17	
5	Shoe Face Crown Gauge	BEC/DG-71/G-23/17	
6	30° Shoe Thickness Gauge	BEC/DG-71/G-24/17	
7	Shoe Back Surface Flatness Gauge	BEC/DG-71/G-25/17	

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

Disassembly Sample size - one assembly

(BEC-71) Draft Gear

S.No	Rubber Pads	SKETCH NO. / DRG. NO.	Observations
1	RF-8 & 9 Elastomer Unit Gauge	BEC/DG-71/G-39/17	

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13. Dimensions by gauging (Wedge) to be measured after disassembly

Sample size - one assembly

(BEC-71) Draft Gear

S.No	Wedge	SKETCH NO. / DRG. NO.	Observations
1	Wedge Lug Depth Gauge	BEC/DG-71/G-26/17	
2	Wedge Top To Top Of Lug Depth Gauge (Min.)	BEC/DG-71/G-27/17	
3	Wedge Top To Top Of Lug Depth Gauge (Max.)	BEC/DG-71/G-28/17	
4	Wedge Lug Width Gauge	BEC/DG-71/G-29/17	
5	Wedge Gauge Dia. Over Outside Of Wedge After Trim And Dia. Over Outside Of Lugs	BEC/DG-71/G-30/17	
6	Wedge Angle Gauge	BEC/DG-71/G-31/17	
7	Gauge For Length Of Wedge Body	BEC/DG-71/G-32/17	

14. Dimensions by gauging (Top Follower) to be measured after

Disassembly Sample size - one assembly

(BEC-71) Draft Gear

S.No	TOP FOLLOWER	SKETCH NO. / DRG. NO.	Observations
1	Inner Follower Outside Contour Gauge	BEC/DG-71/G-33/17	
2	Inner Follower Thickness Gauge For Bottom Flange	BEC/DG-71/G-34/17	
3	Inner Follower Thickness Gauge	BEC/DG-71/G-35/17	
4	Inner Follower Overall Thickness Gauge	BEC/DG-71/G-36/17	
5	Inner Follower Bottom Flatness Gauge	BEC/DG-71/G-37/17	
6	Inner Follower Radius Gauge	BEC/DG-71/G-38/17	

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

Sample size - one assembly
(BEC-71) Draft Gear

S.No	Bore Insert	Dimensions	Observations		
1	Length	104 ± 0.50			
2	Width	54± 0.50			
3	Thickness	5.5± 0.40			

16. Dimensions (Pre-shortener) to be measured after Disassembly

Sample size - one assembly
(BEC-71) Draft Gear

S.No	Bore Insert	Dimensions	Observations		
1	Length	18 + 0.50/-0.00			
2	Width	18 + 0.50/-0.00			
3	Cross Length	19 +0.0/-0.50			

17. Capacity & other tests Sample

size - one assembly

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

S.No	Tests	Last test done on	Remarks
1	Capacity Test		
2	Sturdiness test		
3	Sticking		
4	Uniformity of action		

18. 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 20 of Annexure-1) Of 5% of Purchase Order or 5 in 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.

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(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 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. If any unacceptable gears are found, this will necessitate testing of the next 50 untested gears to 100% capacity. If 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 tested. General requirement of casting acceptance, Marking, Weight variation tested for material heat treatment and hardness as given in AAR S-119'

19. Capacity test Results:

S.No	Draft Gear Heat no. & SL no.	Capacity obtained in Tup hammer test Min. Capacity 45000 ft.lb

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