



Govt. of
India Ministry of
Railways
Research Designs & Standards
Organization Manak Nagar,
Lucknow-226 011

QM-C-7.1/Coupler/00011 (Rev.4)
Inspection Plan (Check Sheet)

ITEM : Upgraded High Tensile Centre Buffer Coupler
: (Coupler Body, Knuckle & Yoke)
Spec. No. : WD-70-BD-10 (Rev.4)
Drg. No. & Alt. : SK-62724, latest alteration (Item-1 & 10, Item-2 & Item-3)

Firm's Name

Date (period) of Inspection

Contract Details:

- Contract no. and date
- Order placing authority
- Specification no.
- Drawing no.

Quantity on order

Earlier Passed Qty.

Quantity offered for inspection on date.

Consignee

Quality Control Manager of M/s

Inspecting Official of RDSO/TPI

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ARVIND KUMAR
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Director (Wagon)
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Manak Nagar, Lucknow-226011

**SUMMARY OF RESULTS OF CENTRE BUFFER COUPLER & COMPONENTS (COUPLER BODY,
KNUCKLE & YOKE)**

Specification No. WD-70-BD-10 (Rev.4) Drawing No.SK-62724 with latest alteration

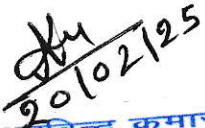
Lot Size – 200 or part thereof

SN	Parameters	Specified Value	Observation	
1	Visual & Operational Check (Sample size 10%)	No cracks, hot tears, cold shuts & weld cracks and surface condition by SCRATA & Marking as per drawing Components should operate freely in assembled condition		
2	Dimensional (Sample size 10% or minimum 10 nos.)	By go-no go gauges (As per RDSO Drawing listed at SN. 15)		
3	Physical Properties	Gr. E (Minimum)	Max.	Min.
	i) Tensile Strength	825 N/mm ²		
	ii) YS	690 N/mm ²		
	iii) Elongation	14%		
	iv) RA	30%		
4	(i) Proof Static tension test	Max. permanent set in mm For knuckle at 181.5t - 0.76mm For Coupler body at 317.5t - 0.76mm. Min Ultimate Load For knuckle 295t For Coupler body & yoke 408t		
	(ii) Proof static test of yoke	Max. Permanent set in mm. At 340.2t 0.76mm Min. Ultimate Load 408t		
5	Chemical composition	C-0.28-0.33 - Mn-0.60-.90- P-0.03- S-0.03- Si-0.40-0.60- Cr-0.50-0.80- Al-0.020-0.050- Ni-0.50-0.60		
6	Microstructure of Knuckle	Fine tempered, Martensite.		
7	Hardness	Except Knuckle 241-311 BHN For Knuckle 241-291 BHN		
8	Impact Test (ASTM A 370)	Energy =3.50 kg. m at -40°C		
9	Nil Ductility Test (ASTM E604& E208)	Value at - 57°C		
10	Destructive test	No blow holes ,slag inclusion, shrinkage etc.		
11	Heat treatment	Record to be checked.		
12	Weight variation	+5% to -3% of the drawing weight		
13	Radiographic test (Sample size 5%)	ASTM E446 Level II. Location of radiography test should be as per annexure – II of specification No.- WD-70-BD-10 (Rev.4)		
14	Magnetic Particle Test (Sample size 5%)	As per Para 7.6 & 8.3 of specification No.- WD-70-BD-10 (Rev.4) & Approved QAP		
15	Painting	As per specification No. WD-70-BD-10 (Rev.4) & Approved QAP		
16	Gauging of Coupler And its Components	As per Annexure-1 of specification No. WD-70-BD-10 (Rev.4)		
17	Process Inspection	As per specification No. WD-70-BD-10 (Rev.4)		

Quality Control Manager of M/s.

Inspecting Official of RDSO/TPI

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 Manak Nagar, Lucknow-226011

1. **Visual, Operation & Marking:** Sample size-10% or min 10 nos.

	Parameter	Observed Value									
		1	2	3	4	5	6	7	8	9	10
Surface defect	Availability of defects such as cracks, hot tears, cold shuts & weld cracks – Yes/No										
	Surface condition by SCRATA (matching with table below – Yes/No)										
Marking	As per respective drawing										
Interchangeability, easy assembly & Operation	Interchangeability – Yes/No										
	Ease of Assembly – Yes/No										
	Proper coupler operation – Yes/No										

Surface finish acceptance level as per SCRATA-

		Critical Area (Fig-8)	Non Critical Area (Fig-8)
A	Surface Roughness	A3	A3
B	Surface Inclusion	B2	B4
C	Gas Porosity	C2	C3
D	Laps	D1	D4
E	Scabs	E2	E2
F	Chaplets	F2	F4
G	Thermal Dressing	G2	G3
H	Mechanical Dressing	H3	H4
J	Welds	J2	J3

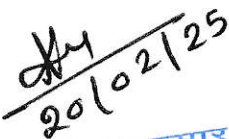
2. **Dimensions:** Sample size-10% or min 10 nos.

Parameter	Observed Value									
	1	2	3	4	5	6	7	8	9	10
As per respective drawing and with gauges as listed by RDSO at S.N.15 of check sheet.										

3. **Physical Test:** Sample size- one from each heat from Test Coupon.

Mechanical Properties	Grade - E (Min)	Observed Value									
		1	2	3	4	5	6	7	8	9	10
UTS	825 N/mm2										
YS	690N/mm2										
Elongation	14%										
RA	30%										

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4. Static Test:

- Sample size- as per para 7.5 of the specification.
- Date of last static test –
- Due date as per para 7.5 of the specification -

4.1 Proof Static test (Permanent set in mm):

Component	At 181.5 t		At 317.5t		Min. Ultimate	
	Specified	Observed	Specified	Observed	Specified	Observed
*Knuckle	0.76		-		295 t	
Coupler body	-		0.76		408 t	

* Based on testing with dummy knuckle fixture.

4.2 Proof Static test (Permanent set in mm):

Component	At 340.20t		Min. Ultimate	
	Specified	Observed	Specified	Observed
Yoke	0.76		408t	

5. Chemical Composition: Sample size- One per heat.

Lot number										
Heat No.										
Body Sl. No.										
Qty. Cast										
Qty. Offered										
Qty. Passed										
Qty. Balanced										

Chemical Analysis	Specified Value (Max. %)	Observed Value									
		Heat (This table shall be filled for each heat separately)									
	Grade E	1	2	3	4	5	6	7	8	9	10
C	0.28-0.33										
Mn	0.6-0.9										
P	0.03(MAX)										
S	0.03(MAX)										
Si	0.40-0.60										
Cr	0.50-0.80										
Al	0.020-0.050										
Ni	0.50-0.60										
Mo	0.15-0.25										

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6. **Microstructure of knuckle, Coupler body and yoke:** Sample size- One per heat.

Parameter	Observed	1	2	3	4	5	6	7	8	9	10
Fine tempered Marten site	OK/ Not OK										

7. **Hardness:** Sample size-10% or min 10 nos. per lot. However, all heat treatment batch of particular lot should be covered. One per heat.

Material Grade	Specified Value	Observed Value									
	BHN No.	1	2	3	4	5	6	7	8	9	10
Grade-E (Coupler body and Yoke)	241-311										
Grade-E (Knuckle)	241-291										

8. **Impact Test (ASTM A-370):** Sample size: Three per heat.

Specified	Observed Value
34.33 J (Min)	

9. **Nil Ductility Test (ASTM E604 & E208):** Sample size: One per heat from CBC Coupler Body & Yoke.

Specified	Observed Value
Value at -57°C	

10. **Destructive Test:** One per lot as per procedure given in para 7.2.5 of specification.

Parameter	Observation
No Blow holes, slag inclusion and Shrinkage etc. after sectioning.	

11. **Heat Treatment:**

Record of heat treatment to be verified as per Clause 5.3.8 of specification.	OK/ NOT OK	Records
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12. Variation of Weight: 10% of the Lot or Minimum 10 numbers (+5% / -3% of the weight given in drawing)

Component	Specified Value (kg.)	Observations
Coupler body	175 – 161.7	
Knuckle	38.8 – 35.9	
Yoke	104.9 – 96.9	

13. Radiographic test (Sample size 5% of the offered lot following the procedure given in para 7.3.1 of the specification) Location of radiography test should be as per Annexure – II of specification No. WD-70-BD-10 (Rev.4).

Parameter of radiography test	Radiography observation Sheet attached as	Observation
Defects like Gas Porosity, Sand & Slag inclusion and Shrinkage up to Level-II shall be accepted.		
Defects like Hot Tear, Crack, Insert, and Motting shall not be permitted		

14. Magnetic Particle Test: As per Para 7.6 & 8.3 of specification No. WD-70-BD-10 (Rev.4) & QAP

15. Painting:

Component/Assembly	Painted as per para 8.8 of the specification (Yes/No)	Remarks

16. Gauge Check: As per RDSO Drawing (Sample size-10% or min 10 nos.)

	Parameters	Gauge No. WD-84073-S-	Observation
COUPLER HEAD	10A Contour Gauge	1-RC	
	Bottom anti-creep Vertical Location	2-RC	
	Bottom anti-creep Horizontal Location	3-RC	
	Top anti-creep Vertical Location	4-RC	
	Pivot Lug	5-RC	
	Pin Protector	6-RC	
	Pulling Lug (Knuckle side)	7-RC	
	Pivot Pin	8-RC	
	Lock chamber	9-RC	
	Lock hole	10-RC	
	Rotary Lug	11-RC	
	Shank end pinhole	12-RC	
Coupler Shank	Shank height	15-RC	
	Shank butt width	17-RC	
	Pin hole shank wail thickness	18-RC	
	Butt rear wall thickness	19-RC	
	Pivot pin hole	20-RC	
	Shank height with Wear Plate	21-RC	
	Shank Length (Non transition)	22-RC	
	Shank butt end contour	23-RC	
	Spherical butt and pin hole	24-RC	
	Shank butt height	25-RC	

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KNUCKLE	Knuckle Bottom Pulling Lug	41-RC	
	Knuckle Movable Point	42-RC	
	Knuckle Hub	43-RC	
	Knuckle Tail Height	44-RC	
	Knuckle Top Pulling Lug	45-RC	
	Knuckle Tail Shelf	46-RC	
	Knuckle Pin Hole	47-RC	
	Knuckle Length	48-RC	

Yoke	Mouth opening	Y-1	
	Concentricity	Y-2	
	Head height	Y-3	
	Strap thickness	Y-4	
	Strap width	Y-5	
	Strap outside width	Y-6	
	Pocket height	Y-7	
	Pocket length	Y-8	
	Back height	Y-9	
	Head width (outside)	Y-10	
	Yoke pin hole	Y-11	

17. Details of in process inspection conducted by inspectors during this Purchase Inspections
(At least one or two in process inspection shall be done)-

Name of process inspection	Remarks (Give in details)

Quality Control Manager of M/s.

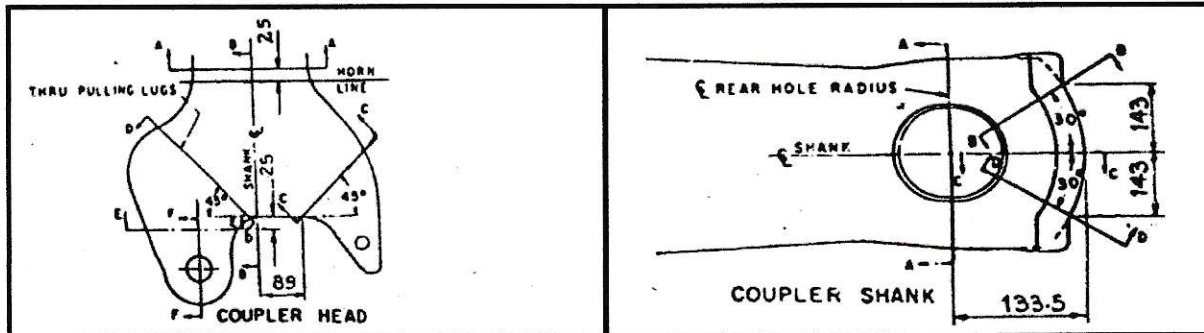
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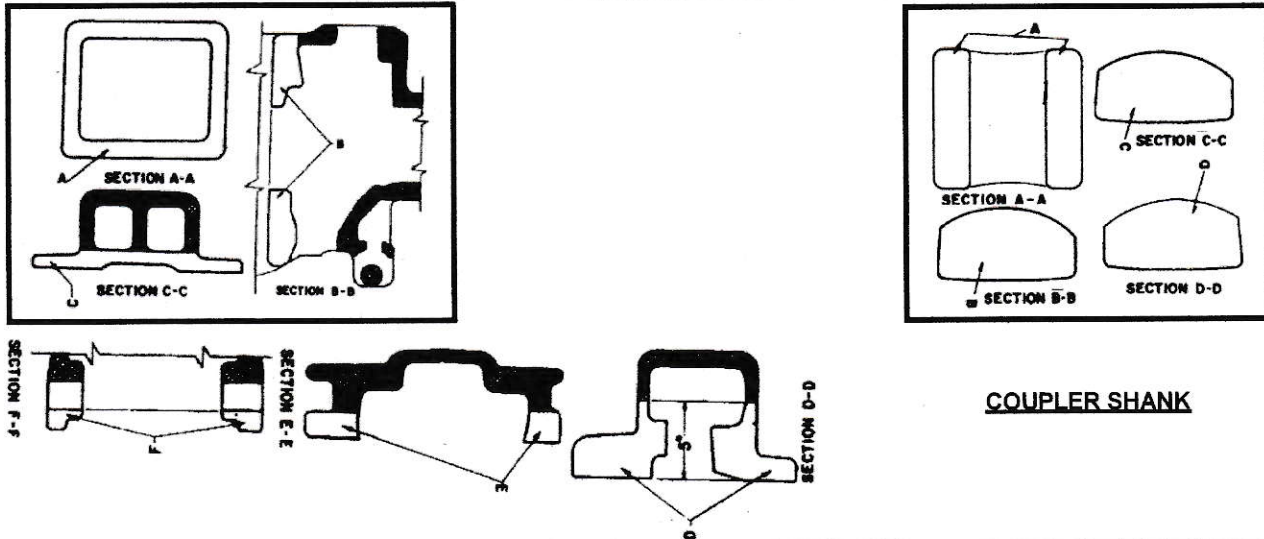
**SEVERITY LEVEL
AS PER SPEC NO. -WD-70-BD-10 (REV-4)**

STR NO.	: WD-70-BD-10, (Rev. 4) or Latest			Date of Inspection	:
Specification No.	: AAR-M-201, GR. - E				
SL.	COMPONENT	CASTINGS' SERIAL - MONTH - YEAR	DATE OF CAST	HEAT NUMBER	REMARKS
1	COUPLER				

COUPLER: INTERNAL SOLIDITY SECTION CUT LOCATION. FIGURE - 2 OF STR NO. WD-70-BD-10



COUPLER: AREAS EVALUATED FOR DISCONTINUITY LEVELS. FIGURE - 3 OF STR NO. WD-70-BD-10



COUPLER SHANK

SL	COMPONENT	SEVERITY LEVEL						REMARKS (IF ANY)
1.	COUPLER HEAD	SECTIONAL AREA	A	B	C	D	E	F
		SPECIFIED - Maximum	3	5	4	4	4	2
	COUPLER SHANK	OBSERVED / ACTUAL						
		SPECIFIED - Maximum	3	4	4	4	-	-
		OBSERVED / ACTUAL						

ATTRIBUTES / PARAMETERS / PROCEDURE

- Section cut areas are rated for solidity are unshaded
- Compared with "Standard" Reference Photographs for casting Solidity included as appendix of STR No.WD-70-BD-10 (Rev. 4)/Latest
- Wall thickness tolerance except where controlled by gauges or RDSO's Drg. Are:

6 mm up to, not including 11 mm wall,	+ 3.0 mm	- 0.8 mm	19 mm up to, not including 32 mm wall,	+ 3.0 mm	- 3.0 mm
11 mm up to, not including 19 mm wall,	+ 3.0 mm	- 2.4 mm	32 mm and over	+ 4.8 mm	- 4.0 mm
- Specified Dimension / locations etc. are printed & observed are written

Remarks (if any) :

Quality Control Manager of M/s.

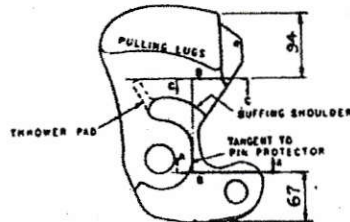
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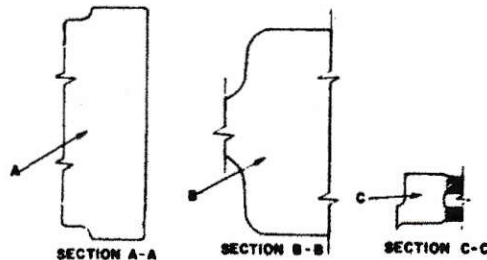
SEVERITY LEVEL AS PER SPEC NO.-WD-70-BD-10 (REV-4)

STR NO.		: WD-70-BD-10 (Rev. 4) or Latest		Date of Inspection		:
Specification No.		: AAR-M-201, GR. – E				
SL.	COMPONENT	CASTINGS'	DATE	HEAT		REMARKS
1	KNUCKLE	SERIAL – MONTH - YEAR	OF CAST	NUMBER	CLEAR DATE	

KNUCKLE: INTERNAL SOLIDITY SECTION CUT LOCATION. FIGURE - 2 OF STR NO. WD-70-BD-10(Rev.4)



KNUCKLE: AREAS EVALUATED FOR DISCONTINUITY LEVELS. FIGURE - 4 OF STR NO. WD-70-BD-10(Rev.4)



SL	COMPONENT	SEVERITY LEVEL				REMARKS (IF ANY)
1.	KNUCKLE	SECTIONAL AREA	A	B	C	
		SPECIFIED - Maximum	4	4	2	
		OBSERVED / ACTUAL				

ATTRIBUTES / PARAMETERS / PROCEDURE

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Remarks (if any) :

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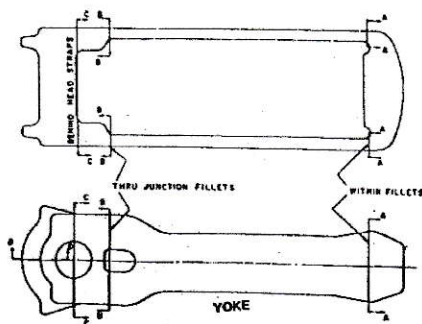
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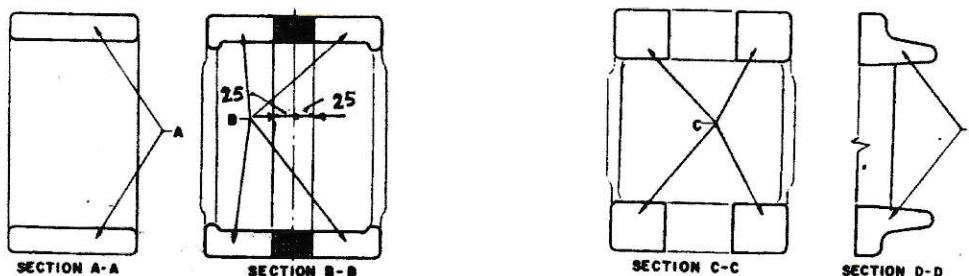
SEVERITY LEVEL AS PER SPEC NO. WD-70-BD-10 (REV-4)

STR NO.	: WD-70-BD-10, Rev. 4 or Latest			Date of Inspection	:	
Specification No.	: AAR-M-201, GR. – E					
SL.	COMPONENT	CASTINGS' SERIAL – MONTH – YEAR	DATE OF CAST	HEAT		REMARKS
1	YOKE			NUMBER	CLEAR DATE	

YOKE: INTERNAL SOLIDITY SECTION CUT LOCATION. FIGURE – 2 OF STR NO. WD-70-BD-10(Rev.4)



YOKE: AREAS EVALUATED FOR DISCONTINOITY LEVELS. FIGURE – 4 OF STR NO. WD-70-BD-10(Rev.4)



SL	COMPONENT	SEVERITY LEVEL				REMARKS (IF ANY)
1.	YOKE	SECTIONAL AREA	A	B	C	D
		SPECIFIED – Maximum	2	2	2	2
		OBSERVED / ACTUAL				

ATTRIBUTES / PARAMETERS / PROCEDURE

- Section cut areas are rated for solidity are unshaded
- Compared with "Standard" Reference Photographs for casting Solidity included as appendix of STR No.WD-70-BD-10(Rev.4)/Latest
- Wall thickness tolerance except where controlled by gauges or RDSO's Drg. Are:

6 mm up to, not including 11 mm wall,	+ 3.0 mm	- 0.8 mm	19 mm up to, not including 32 mm wall,	+ 3.0 mm	- 3.0 mm
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