



**QM-C-7.1/FORGING/0003B**  
**Inspection Plan(Check Sheet)**

**Item:** Screw Couplings & its components for Coaching Stock

**Specn. :** C-9505 Rev. Aug 2001,

**Drg. No. & Alt.:** SK-99001, Alt- .....

- 1) Firm's Name : .....
- 2) Date (Period) of Inspection : .....
- 3) Contract Details :-
  - a) Contract No. & Date : .....
  - b) Order Placing Authority : .....
  - c) Specification No. : .....
  - d) Drawing No. : .....
- 4) Quantity on Order date : .....
- 5) Quantity offered for Inspection : .....
- 6) Delivery Period : .....
- 7) Consignee/ Consignees : .....  
 .....  
 .....  
 .....

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**SUMMARY OF RESULTS**

S.NO.	Parameters	Specified Value	Observations
8.1	Raw Material	35Mn6 Mo3	
	Test Certificate Details		
8.2	Visual Check	10 % or minimum 5 Nos.	
8.3	Dimensional Check of parts	By Go / No Go Gauges/ Measuring instrument.	
8.4	Heat treatment cycle verify time / temperature graph.		
8.5	Mechanical Properties:	UTS : 900-1050 Mpa Yield Stress : 700 Mpa (Min.) Elongation : 15 % (Min.) IZOD Impact : 55 Joules (Min.)	
8.6	Chemical Composition	C: 0.3 to 0.4 % Mn: 1.3 to 1.8 % Si: 0.10 to 0.35 % S: 0.025 % (Max.) P: 0.025 % (Max.) Mo: 0.20 to 0.35 % (Max.)	
8.7	Inclusion Rating	Not worse than 2.0 A, B, C, D in thin Series & 1.0 A, B, C, D in thick Series.	
8.8	Impact test at 1500 Kgm (Destroy whole coupling by gas cutting after impact test)	Total extension after 3rd blow shall not exceed 50 mm on whole coupling or 3 mm on the screw.	
8.9	Destruction Test at 130 MT direct pull load. (Destroy whole coupling by gas cutting after Pull test).	No breakage	
8.10	Proof load test at 75 MT direct Pull. All components are to be examined for deformation separately.	No any Sign. of deformation or permanent set after release of pull.	
8.11	Afresh or repaired on.	Afresh/Repaired	
8.12	Dimensional Check of Assemblies	By Go / No Go Gauges/ Measuring instrument.	
8.13	Marking, painting & Packing	As per drawing, One coat of boiled linseed oil to IS:77. If not mentioned otherwise in P.O. Packed in rigid case/double gunny bags.	

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**9.0 Tests to be carried out for screw coupling assembly and parts –**

- 9.1 (A) Raw Material** - Check original test certificate produced by the manufacturer duly signed by their  
i) Quality Control Manager to ensure that the material of Link, Bent coupling link, Trunnion LH, Trunnion RH, Screw & Pin (to Drg. No. SK-99001) are confirming to 35Mn6Mo3 to IS: 5517-93.

	<b>Parameters</b>	<b>Observation on the basis of Suppliers Record</b>
I.	Manufacture of steel is done in electric arc furnace followed by Secondary refining (Vacuum – degassing is preferable)	
II.	Hydrogen content in the liquid steel is maximum - 2 ppm.	
III.	The Sulphur & phosphorus content during ladle analysis is shall be 0.025 % Max. each.	
IV.	Minimum reduction ratio of 8:1 from the minimum cross- section area of ingot or concast billets to the maximum cross section area of the product is ensured.	

**(B) Tests certificate (TC) no. & date produced by the Supplier –**

- Name of the raw material supplier.
- Raw material supplier should be approved by RDSO.
- Quantity of material indicated on TC.
- Quantity of material used from this TC till this lot offered for inspection.
- Quantity of material used from this.
- Quantity of material balance against this TC for future lots.

**10. Visual Check**

Specified Sample Size – 10% subject to minimum 5 Nos.

Actual Sample Size –

Check the screw coupling and/or spares as follows shall be free from harmful defects.

- ii) **Link, Bent coupling link, Trunnion LH, Trunnion RH, Screw & Pin 60Ø x 218.**

**OBSERVATIONS**

<b>S.No.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Surface Defects										
Formation of Rivet										

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**11. Dimensional Check of parts:**

**(I) Link (Drg. SK-99002, Item No. 1)**

Sample Size – 10% or 5 Nos. min.

Actual Sample Size -

Parameters to be checked :-

Drawing Dimensions (in mm.) with tolerance as per IS: 3469 & IS: 2102	Observed dimensions									
	1	2	3	4	5	6	7	8	9	10
O/D 90 ± 1										
Length 475 (+1.5/-0.7)										
Centre Distance 380 ± 0.5										
Hole dia 47 (+0.2/-0.0)										
Hike 61 ± 0.2										
Thickness 31 ± 0.5										
O/D 80 ± 1										
Thickness 52 ± 0.5										
Thickness 16 (+2/-0) of Section BB of Drg.										
O/D 50 ± 0.5 of Section AA & BB of Drg.										
Thickness 15 (+0.6/-0.4) of Section AA of Drg.										
Width 39 ± 0.3										
Hardness (Between 269 to 331 BHN)										

**(II) Screw (Drg No. SK-99002, Item No. 3)**

Sample Size – 10 % or 5 Nos. min.

Actual Sample Size -

Parameters to be checked :-

Drawing Dimensions (in mm.) with tolerance as per IS: 3469 & IS: 2102	Observed dimensions									
	1	2	3	4	5	6	7	8	9	10
Length (total) 453 ± 2.0										
Length 428 ± 0.8										
Length 38 ± 0.3										
Threaded length 175 ± 0.5										
Dia 58 ± 0.8										
Dia 48.65 ± 0.8										
Knuckle Thread 55 Ø x 6.35 pitch										
Centre Distance 226.5 ± 0.5										
Hardness (Between 269 to 331 BHN)										



**(III) Bent Coupling Link (Drg No. SK-99002 Item No. 2)**

Sample Size – 10 % or 5 Nos. min.

Actual Sample Size -

Parameters to be checked :-

Drawing Dimensions (in mm.) with tolerance as per IS: 3469 & IS: 2102	Observed dimensions									
	1	2	3	4	5	6	7	8	9	10
Centre Distance 46 ( $\pm 0.2$ )										
Centre Distance 260 ( $+2.5/-0$ )										
Dia 42 ( $+1.7/-0.8$ )										
Total Length 348 ( $+2.5/-0.5$ )										
Hole Dia 47 ( $\pm 0.2$ )										
Thickness 35/35 ( $+1.7/-0.8$ )										
Gap 78 ( $\pm 1$ )										
O/D 82 ( $+1.7/-0.8$ )										
Hardness (Between 269 to 331 BHN)										

**(IV) Trunnion LH (Drg No. SK-99002, Item No. 5)**

Sample Size – 10 % or 5 Nos. min.

Actual Sample Size -

Parameters to be checked :-

Drawing Dimensions (in mm.) with tolerance as per IS: 3469 & IS: 2102	Observed dimensions									
	1	2	3	4	5	6	7	8	9	10
Length 76 $\pm 0.8$										
Step Length 15/15 $\pm 0.2$										
Step Length 39/39 $\pm 0.3$										
O/D 76 ( $+0.9/-0.5$ )										
O/D 71 ( $+0.9/-0.5$ )										
O/D 46 ( $+0/-0.2$ )										
Knuckle Thread 55.635 $\varnothing$ x 6.35 pitch										
Hardness (Between 269 to 331 BHN)										

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**(V) Trunniun RH (Drg. No. SK-99002, Item No. 6)**

Sample Size – 10 % or 5 Nos. min.

Actual Sample Size -

Parameters to be checked :-

Drawing Dimensions (in mm.) with tolerance as per IS: 3469 & IS: 2102	Observed dimensions									
	1	2	3	4	5	6	7	8	9	10
Length 76 ± 0.8										
Length 54 ± 0.3										
O/D 76 (+0.9/-0.5)										
O/D 71 (+0.9/-0.5)										
O/D 46 (+0/-0.2)										
Knuckle Thread 55.635 Ø x 6.35 pitch										
Hardness (Between 269 to 331 BHN)										

**(VI) Pin 60 Ø x 218 (Drg. No. SK-99002, Item No. 8)**

Sample Size – 10 % or 5 Nos. min.

Actual Sample Size -

Parameters to be checked :-

Drawing Dimensions (in mm.) with tolerance as per IS: 3469 & IS: 2102	Observed dimensions									
	1	2	3	4	5	6	7	8	9	10
Length (total) 218 ± 1.2										
Head dia 90 ± 0.8										
Head Thickness 20 ± 0.5										
Head Corner Radius 5R										
Pin dia 60 ± 0.2										
Pin Length 198 ± 0.3										
Pin Champher 5 at 45°										
Pin Hole dia 14.5± 0.2										
Hardness (Between 269 to 331 BHN)										

**(VII) Lever & Weight (Drg. No. SK-98155)**

Sample Size – 10 % or 5 Nos. min.

Actual Sample Size -

Checked :- As per drawing.

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**12. Heat treatment Cycle:**

**(I) Link**

This is to be checked for the lot from the time temperature graph available with manufacturer.

S.No.	Parameters	Specified Value	Value as recorder in the Certificate of the firm
1	Temperature of furnace at the time of placing assembly.	Less than 500 deg. C	
2	Time of heat up to gain 860 deg. C Temp.	2 hours (Minimum)	
3	Soaking time at 860 deg. C	1 To 1.5 hours	
4	Tempering Temp.	550 to 650 deg. C	
5	Tempering time at specified Temp. (550-650 deg. C)	1 To 2 hours	

**(II) Bent Coupling Link + Trunnion LH**

This is to be checked for the lot from the time temperature graph available with manufacturer.

S.No.	Parameters	Specified Value	Value as recorder in the Certificate of the firm
1	Temperature of furnace at the time of placing assembly.	Less than 500 deg. C	
2	Time of heat up to gain 860 deg. C Temp.	2 hours (Minimum)	
3	Soaking time at 860 deg. C	1 To 1.5 hours	
4	Tempering Temp	550 to 650 deg. C	
5	Tempering time at specified Temp. (550-650 deg. C)	1 To 2 hours	

**(III) Trunnion RH**

This is to be checked for the lot from the time temperature graph available with manufacturer.

S.No.	Parameters	Specified Value	Value as recorder in the Certificate of the firm
1	Temperature of furnace at the time of placing assembly.	Less than 500 deg. C	
2	Time of heat up to gain 860 deg. C Temp.	2 hours (Minimum)	
3	Soaking time at 860 deg. C	1 To 1.5 hours	
4	Tempering Temp	550 to 650 deg. C	
5	Tempering time at specified Temp. (550-650 deg. C)	1 To 2 hours	

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**(IV) Screw :**

This is to be checked for the lot from the time temperature graph available with manufacturer.

S.No.	Parameters	Specified Value	Value as recorder in the Certificate of the firm
1	Temperature of furnace at the time of placing assembly.	Less than 500 deg. C	
2	Time of heat up to gain 860 deg. C Temp.	2 hours (Minimum)	
3	Soaking time at 860 deg.	1 To 2 hours	
4	Tempering Temp	550 to 650 deg. C	
5	Tempering time at specified Temp. (550-650 deg. C)	1 To 2 hours	

**(V) Pin 60 Ø x 218**

This is to be checked for the lot from the time temperature graph available with manufacturer.

S.No.	Parameters	Specified Value	Value as recorder in the Certificate of the firm
1	Temperature of furnace at the time of placing assembly.	Less than 500 deg. C	
2	Time of heat up to gain 860 deg. C Temp.	2 hours (Minimum)	
3	Soaking time at 860 deg. C	1 To 2.5 hours	
4	Tempering Temp	550 to 650 deg. C	
5	Tempering time at specified Temp. (550-650 deg. C)	1 To 2.5 hours	

**13. Mechanical Properties:**

Sample Size – One per Batch

S.NO.	Mechanical Properties	UTS (900-1050 Mpa)	YS (700 Mpa) Min.	Elongation (15 %) Min.	Izod Impact (55 Joules) Min
1.	Link				
2.	Bent coupling link				
3.	Screw				
4.	Pin 60 Ø x 218				

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**14. Chemical Composition:**

Batch Size - Minimum 100 for screw coupling assembly or Min 300 for spares.-

Sample Size - One per batch for screw coupling assembly.

- One separate part per batch for spares.

Elements Specified in Item	Carbon 0.3 to 0.4 (%)	Manganese 1.3 to 1.8 (%)	Silicon 0.10 to 0.35 (%)	Molybdenum 0.20 to 0.35 (%)	Sulphur 0.025 max (%)	Phosphorus 0.025 Max (%)
Link						
Bent coupling link						
Trunnion LH						
Trunnion RH						
Screw						
Pin 60 Ø x 218						

**15. Metallographic examination inclusion rating (to be checked as per IS:4163) -**

Sample Size - One per batch for screw coupling assembly.

- One separate part per batch for spares.

Specified in Item	A Not more than		B Not more than		C Not more than		D Not more than	
	Thick 1.0	Thin 2.0	Thick 1.0	Thin 2.0	Thick 1.0	Thin 2.0	Thick1.0	Thin 2.0
Link								
Bent coupling link								
Trunnion LH								
Trunnion RH								
Screw								
Pin 60 Ø x 218								

**1<sup>st</sup> stage Inspection (in assembly condition)**

**16. Dimension Checked – 10% or 5 Nos. minimum**

Actual Size –

S. No.	1	2	3	4	5	6	7	8	9	10
Fully opened condition (997 ± 3.0 mm)										
Fully closed condition (771 ± 3.0 mm)										



**17. PROOF LOAD TEST: -**

**Specified value** – The coupling shall be subjected to a direct pull of 75 T. It should not show any signs of permanent set under the pull, after release of pull. The inspector shall verify the records of proof load testing carried out by the manufacturer on 100% screw couplings. After proof load testing, one screw coupling should be completely dismantled and checked for permanent set.

	1	2	3	4	5	6	7	8	9	10
Deflection										
Permanent Set										

**18. Impact test**

Sample Size - One Coupling Per Batch

<b>Specified Value</b>	The extension after third blow shall not exceed 50 min on the whole coupling or 3 mm on the screw, when subjected to the impact of 1500 Kgm. Also the part should not brake, after impact test the coupling which impact test is carried out should be destroyed by gas cutting.
<b>Observation</b>	

**19. Destruction Test**

Sample Size - One per Batch.

<b>Specified Value</b>	Assembly should not brake with a load of 130T under destruction test. After destruction test the coupling of which destruction test is carried out should be destroyed by gas cutting.
<b>Observation</b>	

**20. Painting and Packing**

S.N.	Specified	OBSERVATION (OK / Not OK)
1	Painting with one coat of boiled linseed oil to IS:77	
2	Packing should be proper & in rigid cases.	
3	Weight of each shall not exceed 750 Kgs.	

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