



भारत सरकार रेल मन्त्रालय  
**GOVERNMENT OF INDIA**  
**MINISTRY OF RAILWAYS**

**SCHEDULE OF REQUIREMENTS**  
**FOR DESIGN, PURCHASE AND ACCEPTANCE OF**  
**HIGH TENSILE TIGHT LOCK TRANSITION CENTRE BUFFER COUPLER**  
**FOR**  
**INDIAN RAILWAY BROAD GAUGE LOCOMOTIVES**

विशिष्ट सं. चा.श.-0.41.00.05 (संशोधन 02)

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अनुसंधान अभिकल्प और मानक संगठन

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### SCOPE

The locomotives of Indian Railways are fitted with AAR 'E' type couplers with transition screw coupling and side buffers. With the introduction of coaches fitted with 'H' type tight lock CBCs on Indian Railways, problem of slack is experienced between the 'E' type coupler of locomotive and adjacent 'H' type tight lock coupler on the coach and hence, the need of a appropriately designed 'H' type tight lock coupler with provision of transition screw coupling is necessary for fitment on locomotives. The fitment of transition screw coupling on locomotives is essential as these locomotives are used for hauling coaching stock fitted with tight lock 'H' type couplers as well as other rolling stock fitted with screw couplings and 'E' type couplers.

Hence, Indian Railways require design of a coupler that can be used for passenger, freight and mixed service operations and this schedule is meant for this purpose of designing a coupler with suitable changes in the 'H' type coupler head without affecting the anti climbing feature. The existing draft gear and yoke shall be retained on all types of Broad gauge diesel and electric locomotives and the new design of coupler shall be retrofittable on the existing Indian Railway locomotives.

The new coupler shall conform to the guidelines and clauses given in this specification in respect to design, material, manufacturability, testing and repair etc.

### IMPORTANT

Tenderers are advised to go through this schedule carefully. In case they need clarification regarding any of the clauses of this schedule, they shall contact Director General (Motive power), RDSO, Manak Nagar, Lucknow -226 011 (India).

**RDSO's Fax No. 91 - 0522 - 2453916**

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2. SKDL-508 - Fabricated striker block for CBC for BG locomotives.
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4. SKDL-890 - Details for uncoupling gear of transition CBC.
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8. SKDL-2496 - Clevis for modified Transition screw coupling for CBC of Broad Gauge locomotives.
9. SK-62724 - Details for Transition and Non-Transition CBC.
10. GM Drawing no. 10661374 - Assembly drawing of coupler /Draw gear/buffer application for GM's passenger Locomotive (WDP4)
11. Mukand's Drg. No. SD-2381 - Coupler head assembly for GM's passenger locomotive(WDP4)
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## SCHEDULE OF REQUIREMENTS FOR DESIGN, PURCHASE AND ACCEPTANCE OF HIGH TENSILE TIGHT LOCK TRANSITION CENTRE BUFFER COUPLER FOR INDIAN RAILWAY BROAD GAUGE LOCOMOTIVES

### 1.0 FOREWORD

- 1.1 This specification is intended to cover the technical provisions relating to design, material, construction and tests and does not include all the necessary provisions of the contract.
- 1.2 Whenever there is a conflict among the stipulations in the present specification, drawings or any of the relevant specifications, the most stringent requirement will apply. All specifications and drawings shall be of latest revision / alteration.

### 2.0 SCOPE

- 2.1 This schedule covers the technical provisions relating to design, purchase and acceptance requirements for an high tensile tight lock transition center buffer coupler and its associated components including AAR 'H' type coupler head with provision for fitment of transition screw coupling, clevis with pin and washer, coupler operating mechanism with mounting brackets and coupler carrier for fitment on broad gauge locomotives of Indian Railways.

### 3.0 DEFINITIONS

- 3.1 'PURCHASER' means the Ministry of Railways, or an administration under the Ministry of Railways, on behalf of the President of the Republic of India.
- 3.2 'IR' means Indian Railways.
- 3.3 'RDSO' means Research Designs and Standards Organisation Manak Nagar, Lucknow - 226 011.
- 3.4 'INSPECTING AUTHORITY' means the representative of RDSO nominated by Director General/RDSO to inspect the supply on behalf of the PURCHASER.
- 3.5 'TENDERER' means the firm/company that submits offer for supply of centre buffer couplers (hereinafter referred to as couplers), and associated components as per this schedule.
- 3.6 'CONTRACTOR' means the firm/company on whom order, for supply of couplers and associated components, in full or part, as per this schedule, is placed.
- 3.7 'SUB-TENDERER' means any firm or company from whom the TENDERER may obtain an item of supply not necessarily manufactured by the TENDERER himself.
- 3.8 'SUB-CONTRACTOR' means any firm or company from whom the CONTRACTOR may obtain any material, assemblies or sub-assemblies used for the manufacture of couplers and other associated components.
- 3.9 'SPECIFICATION', unless otherwise mentioned, refers to specifications of IR/RDSO and the same could be procured from DG/RDSO on normal payment basis.

### 4.0 PARTICULAR REQUIREMENTS

- 4.1 The coupler shall be of transition type and shall be couplable with all the AAR Type 'E' couplers being used on existing locomotives to RDSO specification No. 56-BD-97 & drawing number SKDL-3430, GM passenger locomotive (WDP4) to GM drawing No. 10661374 and coaching stock fitted with screw coupling arrangement as well as 'H' type tight lock couplers. Design parameters and

operating conditions of sample locomotive are as indicated in annexure-A. Details of couplers and draft gears used on I.R. broad gauge locomotives are given in annexure B & C respectively.

- 4.2 Coupler head shall be to AAR 'H' type tight lock with the provision for fitment of transition screw coupling and contour shall be to APTA-SS-M-002-98 (Standard S-166 & S-168). The contour slack when two such couplers are coupled together should not be more than 3.5 mm in new condition. The guard arm of the coupler shall be at the centerline of the coupler. The coupler design excluding head portion (for other than WDP4 locomotives) shall be as per item 18 of RDSO drawing no. SK-62724.
- 4.3 Clevis shall have proof load of 750 KN and the existing design of transition screw coupling to drawing no. SKDL-2494 & 2495 shall be retained. Clevis shall be suitably designed to fit into modified coupler head and shall remain properly engaged with the knuckle during starting of train and also in traction, buff and braking modes while hauling coaching stock with screw couplings.
- 4.4 Coupler mounting arrangement on underframe shall be generally to drawing No.SKDL-3430 applicable for existing I.R. broad gauge locomotives (excluding WDP4 locomotive), with coupler tail end design suitably adapted to fit into existing AAR type draft gears of I.R. locomotives. For GM passenger locomotive (WDP4), shank and tail end design shall conform to M/s Mukand's drawing No. SD-2381. Coupler head, clevis and screw coupling shall be same as in para 4.2 and 4.3.
- 4.5 The existing draft gear and yoke shall be retained on all the locomotives. The coupler pocket and draft gear pocket lengths on under frame shall remain unchanged and redesigned coupler shall be suitable for fitment on both new and existing locomotives.
- 4.6 The coupler operating mechanism shall comprise of steel rods for articulation and use of wire or any other limp / flexible material in the articulation shall not be accepted.
- 4.7 Spring loaded coupler carrier shall be suitably provided avoiding any shifting / modification of the existing cattle guard.
- 4.8 The design of coupler head shall enable coupling of two couplers with a maximum vertical displacement of their center lines of 90 mm, without manual assistance. The horizontal gathering range of the coupler heads shall be 110 mm on either side of the longitudinal center lines when coupled with 'H' coupler.

**4.9 MATERIAL AND MANUFACTURE OF STEEL CASTINGS**

- 4.9.1 Except for locks and knuckles, cast steel (including clevis) shall be furnished and marked in accordance with AAR Specification M-201 Grade E. The locks and knuckles shall be furnished in accordance with para 4.14.1.

**4.10 CHEMICAL COMPOSITION AND TESTS**

**4.10.1 Chemical Composition**

The steel analysis shall not exceed the following:

Carbon, Maximum percent	0.32
Manganese, maximum percent	1.85
Phosphorus, maximum percent	0.03
Sulfur, maximum percent	0.03
Silicon, maximum percent	1.50

#### 4.11 CHEMICAL ANALYSIS

##### 4.11.1 Ladle analysis

The manufacturer shall carry out test of samples taken during the initial 25 percent of the castings poured from each ladle to determine the percentage of carbon, manganese, phosphorous, sulphur, silicon and of the other intentional alloying elements. The results of analysis shall be reported to Inspecting Authority and shall conform to the requirements of para 4.10.1. If drillings are used, they must be taken at least 6.5 mm beneath the surface of the test ingot.

##### 4.11.2 End of heat analysis

Manufacturer to determine the percentage of manganese must use a sample found with last acceptable castings of each heat. The results of this analysis must be reported to Inspecting Authority and shall conform to the requirements of para 4.10.1. If drillings are used, they must be taken at least 6.5 mm beneath the surface of the test ingot.

##### 4.11.3 Test lugs

For all castings, at least two and not more than four test lugs shall be cast. The location of test lugs shall be such that when removed, they shall indicate steel castings have been subjected to heat treatment. The standard test lug shall be 25 mm in height, 25 mm in width and 13 mm or 16 mm in thickness where it joins with castings.

If, in the opinion of the Inspector, a casting if not heat-treated, will be heat-treated.

#### 4.12 HARDENABILITY

4.12.1 Composition of Grade E steel, except for coupler locks, shall produce in the standard Jominy test the minimum hardness at 11 mm from the quench end for the carbon composition as follows, based on the initial composition :

Carbon percent	Minimum Hardness (Rc)
Up to 0.25	30
0.25 to 0.30	33
0.31 to 0.32	35

##### 4.12.2 Frequency of testing

The manufacturer shall carry out Jominy tests on the following frequency:

- a) On every heat till ten (10) consecutive heats gives satisfactory test results.
- b) On satisfactory Jominy test results for ten (10) consecutive heats at least one test every month.

On unsatisfactory Jominy test results during monthly tests, tests on every heat till ten (10) consecutive satisfactory tests.

##### 4.12.3 Hardenability calculations

The ideal critical Diameter (D1) shall be calculated for each heat of quenched and tempered steel in accordance with ASTM Designation A 255 latest revision, Appendix III. The calculated dia. shall be indicated in test records and the Quality Assurance Plan (QAP).

#### 4.13 MECHANICAL PROPERTIES AND TESTS

Each melt shall be tested for mechanical properties after heat treatment. The coupons from each melt shall be heat treated with castings of the same grade, in the same manner as the casting they represent.

**4.13.1 Tensile test specimen coupons**

The coupons shall either be cast attached to the castings or the gating system or produced from keel blocks and prepared in accordance with ASTM Designation A 370, latest revision.

**4.13.2 Tension test**

4.13.2.1 Test shall be conducted in accordance with standard methods and definition for mechanical testing of steel products, ASTM standard A 370, latest revision, using 13mm round, 51mm gauge length specimens as illustrated in that specification. Specimens are to be removed from coupons produced as per para 4.13.1 and shall meet the following minimum requirements:

Tensile Strength Kg/Sq.cm. (minimum)	8435
Yield Point Kg/Sq.cm. (minimum)	7030
Elongation in 51 mm (minimum %)	14
Reduction in area, %	30

4.13.2.2 One specimen per heat for each grade of steel shall be tested. If test specimen shows a defect during machining or exhibits flaws before or after testing, it should be discarded and another specimen substituted.

**4.13.3 IMPACT TEST**

4.13.3.1 The manufacturer shall carry out tests to determine impact properties of Standard Charpy-V-Notch type "A" specimens prepared as shown in ASTM Standard A370. Specimens to be removed from coupons prepared as per para 4.13.1. A test consists of determining the average energy absorbed from three-impact specimens from the same heat. The results should meet the following minimum requirements at the following temperatures.

Cast steel	Temp. °C	Energy Kg.m.
Grade E	-40	2.77

4.13.3.2 The manufacturer shall test specimen and record results, including chemistry of that heat, excluding flawed specimens. Frequency of such test shall be one heat per week per grade of steel during pouring of the last 25 percent of the heat. Specimens to be removed from coupons as per para 4.13.1 and test shall be conducted in accordance with Standard Methods and Definitions of ASTM Standard A 370, latest revision.

**4.13.4 HARDNESS**

4.13.4.1 The cast steel components must meet the following Brinell hardness range:

Grade	BHN Range
Grade E steel castings (except lock and knuckle)	241-311
Grade E, lock and knuckle	241-291

4.13.4.2 Testing shall be done on a surface that has been ground to remove decarburisation in accordance with ASTM A 370. The hardness shall be checked on the location as shown in annexure-E. Hardness of the components not shown in figure shall be checked at suitable location.

#### 4.14 HEAT TREATMENT

4.14.1 Knuckles and locks shall be heated to the proper temperature above the critical range for the required time and upon removal from the furnace shall be subjected to accelerate cooling by immersion in a suitable liquid medium. All quenched castings (except knuckles and locks) shall be tempered immediately following the quenching operation to a hardness of Brinell number range of 241 - 311. Knuckles and locks shall have a Brinell hardness range of 241 - 291.

4.14.2 After pouring, castings shall be allowed to cool to a temperature below 538 deg. C prior to heat treatment at a rate that would not be injurious to the castings.

4.14.3 Grade E steel castings shall be furnished quenched and tempered.

4.14.4 **Quenched and tempered steel castings shall be processed in the following order, also keeping in view the requirements of para 4.14.1.**

4.14.4.1 Heat to the proper uniform temperature above the transformation range and hold for the proper time to achieve complete austenization and to refine the grain structure.

4.14.4.2 Withdraw from furnace while castings are above the transformation range, subject to rapid cooling by suitable liquid medium to a temperature substantially below the transformation range.

4.14.4.3 Temper by reheating to proper uniform temperature below the transformation range, but not less than 427 deg. C, Hold for the required time, remove from the furnace and allow to cool at any desired rate. All castings prone to cracking after quenching shall be tempered as soon as necessary to prevent cracking, but in no case shall the time between quenching and tempering exceed eight hours.

4.14.5 All the stages of heat treatment with various temperature ranges of processes shall be clearly brought out in QAP. Inspecting Authority may examine it with actual heat treatment process being followed as and when required.

#### 4.15 DESTRUCTIVE TEST

One number or 2% of the lot (Whichever is more) shall be subjected to destruction to examine the presence of casting defects. Defects such as blow holes, slag inclusions, shrinkage, etc. are not acceptable. Porosity to a level of 2% of the cross section may be considered acceptable. Knuckle, coupler body shall be subjected to destructive test. The location for the test shall be as per Annexure- F, G & H.

#### 4.16 RADIOGRAPHIC TEST

One number or 5% of the lot (Whichever is more) shall be subjected to Radiographic examination on Knuckle and Coupler body and level of acceptance shall be as per ASTM E-446 Level-II. The location for Radiographic test shall be as per Annexure- F, G & H.

#### 4.17 MICRO-STRUCTURE TEST

With a view to ensure the homogeneity of the steel and the quality of heat treatment, it is essential to examine the microstructure of the knuckles at the time of acceptance inspection. The samples should be taken from the actual castings produced and not from the separately cast test bars. Microstructure achieved shall be Fine Tempered Martensite.



#### 4.18 WEIGHT VARIATION

Variation in weight of Coupler body and other components, viz. Knuckle, Lock, Rotary parts shall not vary more than FIVE percent above or THREE percent below what has been determined as the average weight ascertained from the actual weight of 20 nos. or lot (Whichever is less) of each of the coupler components verified for dimensional accuracy in presence of Inspecting Authority.

Those coupler components which do not fall within the prescribed limits of weight variation shall be rejected by manufacturer.

### 5. COMPONENTS PERFORMANCE AND TEST REQUIREMENTS

#### 5.1 PROOF TESTS

5.1.1 Coupler bodies and knuckles shall meet permanent set and ultimate strength requirements shown in paragraph 5.1.4. The dimensions shown in annexure-D shall be used for determining permanent set, and results recorded. Special test knuckles for testing coupler bodies shall have a load capacity in excess of 408 tonnes.

5.1.2 When testing coupler bodies, if test knuckle breaks before required loading is attained, the test shall be terminated and the load recorded as the 'maximum applied load.'

5.1.3 Test machines shall have a minimum capacity to meet specified loads and be calibrated to ASTM standards.

5.1.4 Static Tension Test requirements:

Maximum permanent set in mm for Grade E Steel

	At 181.5 t.	At 317.5 t.	Minimum Ultimate
* Knuckle	0.76 mm	-	295 t.
Coupler body	-	0.76 mm	408t.

\*Based on testing with dummy knuckle fixture.

#### 5.1.5 Proof test of clevis

5.1.5.1 The clevis shall be able to withstand a proof load of 750 KN without any deformation. Method of testing shall be as given in RDSO drawing No. SKDL-2496.

### 5.2 COUPLER OPERATION

5.2.1 The coupler assembly shall be checked in accordance with clause 6.8 of APTA RP-M- 003-98.

### 5.3 CASTING FINISH

5.3.1 Riser pads and gate stubs shall not project more than 6mm above the surrounding surface at any location, where interference would exist in the operation or application or where serviceability would be affected, the riser pads and gate stubs shall be contoured to surrounding areas.

5.3.2 Castings shall be blasted sufficiently clean to permit thorough, visual Inspection. Prior to shipment, castings shall be free of dirt, rust, or loose material that would affect operation. Couplers must not be sand or shot blasted when completely assembled.

5.3.3 The castings shall not be painted or covered with any substance that will hide defects. However, manufacturer's and/or purchaser's paint identification marks are acceptable.

#### 5.4 LUBRICATION

- 5.4.1 Only dry lubricant shall be applied to the coupler head or the coupler head fittings. This lubricant may be applied using water, alcohol, or other non-petroleum based carrier.

#### 5.5 MARKINGS

- 5.5.1 The coupler shall be marked in accordance with clause 6.12 of APTA RP-M- 003-98.
- 5.5.2 The manufacturer shall ensure that marking details are legible and are of good quality, which shall remain legible throughout the entire service life of coupler and its components. The marking shall be done at the casting stage itself so that the marking shall remain legible during entire service life of the components. The manufacturer will not be permitted to provide manufacturer's code and marking by electric arc welding in case these are not visible at casting stage.

#### 5.6 GENERAL REQUIREMENTS FOR CASTING ACCEPTANCE

This section defines and classifies casting defects and is to be used for visual inspection and gauging of coupler bodies, knuckles and locks by the manufacturer before offering for Purchase Inspection.

##### 5.6.1 Surface acceptance level

Surface acceptance level for steel casting components of the coupler offered shall conform to the relevant clauses of AAR specification No. M-211.

##### 5.6.2 Evidence of improper heat treatment

Evidence of improper Heat Treatment as shown from manufacturer's records shall not be accepted. Heat treatment lugs may be used by Inspecting Authority to assist in the determination of improper heat treatment.

#### 6. QUALIFYING REQUIREMENTS

The TENDERER shall meet the qualifying requirements listed below and submit the documents in support thereof, along with the offer.

- 6.1 The firm offers 'H' type coupler designed by any member of MCSCM for IR. The firm shall have all the design and manufacturing drawing details of such 'H' type coupler. The firm shall submit proof in support to RDSO, having design and manufacturing drawing details from any member of MCSCM.

Or

The firm offers 'H' type coupler designed by any reputed R&D agency of established Railways/ companies for IR. The firm shall have all the design and manufacturing drawing details of such 'H' type coupler. The firm shall submit proof in support to RDSO, having design and manufacturing drawing details from any reputed R&D agency of established Railways/ companies.

Or

The firm who have developed their own design of 'H' type coupler by reverse engineering. However, these firms shall be in the business of either in manufacture of couplers (or) design / manufacture of draft gear.

Or

The firm offering 'H' type coupler is having MOU with RDSO approved firms for design and manufacturing. The firm shall have all the design and manufacturing drawing details of such 'H' type coupler. The firm shall submit proof in support to RDSO, having design and manufacturing drawing details from RDSO approved firms.

Or

Firm is proven and approved source of RDSO for H type coupler for coaches can be considered for locomotives and vice versa.

- 6.2 The TENDERER or SUB-TENDERER should have a well equipped foundry with requisite heat treatment facilities, sound R&D set-up and that the TENDERER or SUB-TENDERER regularly manufactures and supplies similar type of coupler offered. The foundry shall be Class 'A' certified. Foundries from where the existing vendor sourcing the casting would be given 1 year for complying the requirement of Class 'A' foundry.
- 6.3 The TENDERER should have machining and testing facilities to manufacture and supply the couplers within the delivery schedule. Firms will be given 1 to 2 years time for complying the requirement.
- 6.4 The TENDERER should have a well-established quality control system and organizational set-up, to ensure adequate quality, at all stages of manufacture. TENDERER and SUB-TENDERER shall obtain AAR M 1003 certification or IRIS certification or equivalent for quality assurance. Firms will be given 1 to 2 years time for complying the requirement of AAR M 1003 certification or IRIS certification or equivalent.
- 6.5 **This para deals with the design, manufacture, testing and inspection of the couplers.**
- 6.5.1 The general design and the arrangement drawing of the coupler showing draft gear in position shall be got approved from RDSO.
- 6.5.2 The tenderer/ sub-tenderer shall prepare QAP for the manufacture and inspection of the coupler, and it should be submitted to RDSO for approval.
- 6.5.3 In process inspection on samples selected at random shall be done by RDSO after the casting of the components and after the machining of the components of coupler head for verifying conformance with the drawings.
- 6.5.4 List of the manufacturing and acceptance gauges, used by the tenderer or the sub-tenderer to check the internal components including clevis and the coupler head to ensure interchangeability, shall be submitted to RDSO.
- 6.5.5 Repeated coupling and uncoupling operation must be performed on two newly developed couplers on a special test rig made for this purpose by the tenderer or sub-tenderer to ensure repeatability of the coupling and the uncoupling. The functioning of anti-creep mechanism will be checked before the tests and after every 50 operations thereafter. The number of operations shall be decided while finalising the test plan, depending upon the characteristics of the design offered.
- 6.5.6 Repeated coupling and uncoupling operation must be performed on the newly developed coupler head and the coupler head of approved make (locomotive/coach) on a special test rig made for this purpose by the tenderer to ensure repeatability of the coupling and the uncoupling. The number of operations shall be decided while finalising the test plan, depending upon the characteristics of the design offered.
- 6.5.7 Functional tests on the couplers shall be carried out as per the agreed protocol between the contractor and the RDSO. After this, the prototype coupler shall be fitted on the I.R BG locomotive

for trial purpose and it's couplability with 'E' coupler on locomotive and screw coupling on coach, shall be tested.

- 6.5.8 The TENDERER shall specify the wear limits for the components of the coupler head and demonstrate the functioning of the coupler head with fully worn components.
- 6.5.9 Strength tests are to be done on the coupler as per the clause 5.1 of this schedule.
- 6.5.10 A test plan should be submitted by the tenderer and after the assessment of the test plan along with the design of coupler offered, RDSO may modify or supplement the test plan before granting approval.
- 6.6 The TENDERER shall submit copies of letters / certificates in support of qualifying requirement.
- 6.7 In addition to the above, further information, if required by the PURCHASER, shall be promptly provided by the TENDERER / CONTRACTOR.
- 6.8 TENDERER not submitting the above mentioned requisite information should note that incomplete offer is liable to be rejected.

## **7. GENERAL REQUIREMENTS**

- 7.1 The CONTRACTOR shall set aside one set of gauges for the exclusive use of INSPECTING AUTHORITY. The accuracy of gauges shall be checked by the INSPECTING AUTHORITY before the commencement of manufacture. Recalibration shall, subsequently, be done at the frequency stipulated in internal Quality Assurance Programme. Gauge drawings, in original, shall also be made available for checking the tolerances of these gauges.
- 7.2 Inspection of coupler and associated components shall be carried out by the INSPECTING AUTHORITY and notwithstanding what has been specified in this schedule, inspection shall be conducted as per relevant standard international practices / specifications and as mutually agreed to by the INSPECTING AUTHORITY and the CONTRACTOR. In case of dispute, however, the decision of the PURCHASER shall be final. If PURCHASER desires, in process inspection can be carried out at the manufacturing stage also.
- 7.3 The inspection of couplers and associated components shall be done at the CONTRACTOR'S premises. The CONTRACTOR shall also provide, at his cost, labour and appliances / gadgets required by the INSPECTING AUTHORITY for conducting complete inspection as required under the Contract.
- 7.4 The CONTRACTOR shall be responsible for execution of the Contract in accordance with this schedule and for satisfactory fitment and operational performance of the couplers supplied, irrespective of any approval which the PURCHASER / RDSO may have given.
- 7.5 The CONTRACTOR shall provide adequate supervision to ensure satisfactory fitment of ten (10) coupler sets and satisfactory service performance.
- 7.6 The CONTRACTOR shall also provide, training to IR officials, at his own cost, regarding maintenance practices of the coupler system.
- 7.7 The design of coupler and associated components shall be such that it may not warrant any major maintenance / attention before 05 years and overhauling before 10 years of service.
- 7.8 The coupler offered shall render a service life of 35 years.

## **8. SUPPLY OF TECHNICAL DATA OF COUPLER**

- 8.1 TENDERER shall submit complete assembly drawings, and related specifications of the coupler and assembly being offered by him.

8.2 The contractor shall submit requisite drawings with important controlling dimensions and tolerances thereon with the surfaces and dimensions necessary to be gauged. Separate drawings in A<sub>1</sub> / A<sub>2</sub> size for each of the components of the coupler assembly shall be submitted with the offer. Each drawing shall indicate sufficient sectioned views of the component. These drawings shall be complete in respect of:

8.2.1 Material specification.

8.2.2 Estimated weight.

8.2.3 Dimensions.

8.2.4 Reference of detailed manufacturing drawings.

## 9. SUBMISSION OF OFFERS

9.1 TENDERER shall submit offers separately for the two designs of couplers, one for fitment on all broad gauge locomotives (excluding GM PAC locomotives) and the other for fitment on GM PAC locomotives.

9.2 TENDERER shall offer clause by clause comments on this schedule, confirming compliance with all the clauses and elaborating, wherever necessary. In case there be any deviations, complete details of alternate proposal against the clause/s shall be given as a consolidated '**STATEMENT OF DEVIATIONS**'. In the absence of any deviation, however, a '**NO DEVIATION STATEMENT**' shall be, **necessarily**, given.

9.3 A copy of TENDERER'S internal quality assurance programme including certification of casting integrity and internal process specification shall be submitted.

9.4 English translation of Standards quoted (other than those referred to in this schedule) and other documents shall be submitted with the offer.

9.5 The tenderer shall submit a detailed programme for indigenisation of the CBC and the associated components. The phases of indigenization along with the volumes should be clearly mentioned. The indigenization programme shall be considered while evaluating the offer.

9.6 Offers, which are incomplete in respect of details indicated, vide clauses 9.1 to 9.5 above are liable to be ignored.

## 10. MAINTENANCE OF COUPLERS

10.1 The TENDERER shall provide detailed instructions for day-to-day and workshop maintenance and shall include the following:

10.1.1 Detailed work content of various inspection / maintenance practices, including procedure for assembly and fitment of couplers. The work content of each schedule shall also be intimated.

10.1.2 The TENDERER shall also submit a list of technical specification (for procurement purpose) of all special purpose tools, gauges and their drawings and testing / measuring instruments required for examination, repair and over-hauling / reconditioning of couplers. Price proposal for these tools, gauges and testing / measuring instruments shall also be submitted with the offer separately.

10.1.3 After successful trial of the new design of the coupler, the TENDERER shall make recommendations suggesting scale of spares to be maintained for holding 500 couplers for a period of 10 years. Price proposal for these spares shall also be submitted, with the offer separately.

- 10.1.4 The TENDERER shall specifically advise criteria for replacement of components of couplers during maintenance.
- 10.1.5 The TENDERER shall submit copy of Maintenance Manual, which details the maintenance procedures for couplers in workshops and open lines.
- 10.1.6 The CONTRACTOR shall supply at least three copies of maintenance manual against the developmental order and after successful trial, 10 copies of maintenance manual for every supply of 500 couplers should be supplied.

## **11. GUARANTEE**

- 11.1 The CONTRACTOR shall, at his cost, replace the couplers and associated components failing prematurely or proving unsatisfactory in service for reasons attributed to defective / faulty design, defective material or poor workmanship within a period of 48 months from the date of delivery or 36 months from the date of fitment, whichever is earlier. This warranty shall survive, notwithstanding the fact that the couplers may have been inspected, accepted and payment thereof made by the PURCHASER. For the replaced coupler, the period of 36 months shall commence when the replaced coupler is commissioned in service. The sole judge in this case shall be the PURCHASER.

Annexure-A

Design Parameters of Loco and Operating Conditions for Coupler

1. Locomotive type : Diesel-Electric/Electric/Shunting locos.
2. Length over buffer beams : 21030 mm.
3. Length over the buffers : 22300 mm.
4. Distance between bogie pivot centres : 14020 mm.
5. Weight of locomotive : 132 t.
6. Axle load : 22 t.
7. Gross Load (Rake) : 1600 t.- 5000 t.
8. Grade : 1 in 37 (steepest).
9. Type of brake system : Air brake / Vacuum brake.
10. Speed (maximum) : 110 km/h (with 26 coaches)  
: 160 /200km/h (with 18 coaches)  
: 20-60 km/h (with 56 BOXN wagons).
11. Curve (Sharpest) : 175 m (radius) with twin unit.
12. Maximum Shunting Speed : 9.5 km/h.
13. Climatic & Environmental Conditions
  - 13.1 Maximum Temperature (under the sun) : 70°C.
  - 13.2 Maximum Temperature (under shade) : 52°C
  - 13.3 Minimum Temperature (at night) : -5°C
  - 13.4 Rainfall : Fairly Heavy
  - 13.5 Humidity : 100% saturation
  - 13.6 Environment : Dusty during hot weather and saline in coastal areas.
14. Wheel Diameter (for locos) : 1092 mm (new)  
: 1016 mm (condemning).
15. Maximum coupling/uncoupling operation : 12 per day.
16. Locomotive strength : 400 ton end load
17. Existing type of coupler on locomotive: AAR 'E' type head with swivel shank for GM's passenger locomotive (WDP4) and E/F type coupler for other locomotives.
18. Nominal height of coupler from rail level : 1090 +15 / -5 mm
19. Number of side buffers per locomotive : 2 on each end of locomotive (#)

NOTE: # Locomotives are provided with Centre buffer couplers and side Buffers.



Details of E/F Type Coupler and GM Passenger Locomotive Coupler

Feature	E/F coupler	GM Passenger locomotive (WDP4) coupler
Type of head and shank	'E' type head and 'F' type shank	'E' type head and swivel shank
Length from coupling line to the end of shank of coupler body	1041.6 mm	812.8 mm
Yoke type	Y 45 AE AAR type	Keystone's 48165-1
Draft gear pocket length	625.5 mm	295.275 mm
Dist. Between coupling line and buffer beam	641 mm	641 mm
Coupler pocket length	1325 mm	1216.66 mm
Angular displacement of shank in one side	19°	29° (max)
Draft gear type and capacity	1.Mark-50 (steel coil-spring) - 52.7 KJ. 2.RF-361 (rubber spring) - 56 KJ.	MS-488-6A and 37.5 KJ.
Draft gear travel in buff mode (max)	Mark-50 - 81.5 mm RF-361- 67.8 mm	41 mm
Shank connection with yoke	Vertical cylindrical pin	Vertical cylindrical pin
Weight of Draft gear with yoke in Kgs.	Mark-50 - 270.18 RF-361 - 277..88	MS488-6A - 204.12

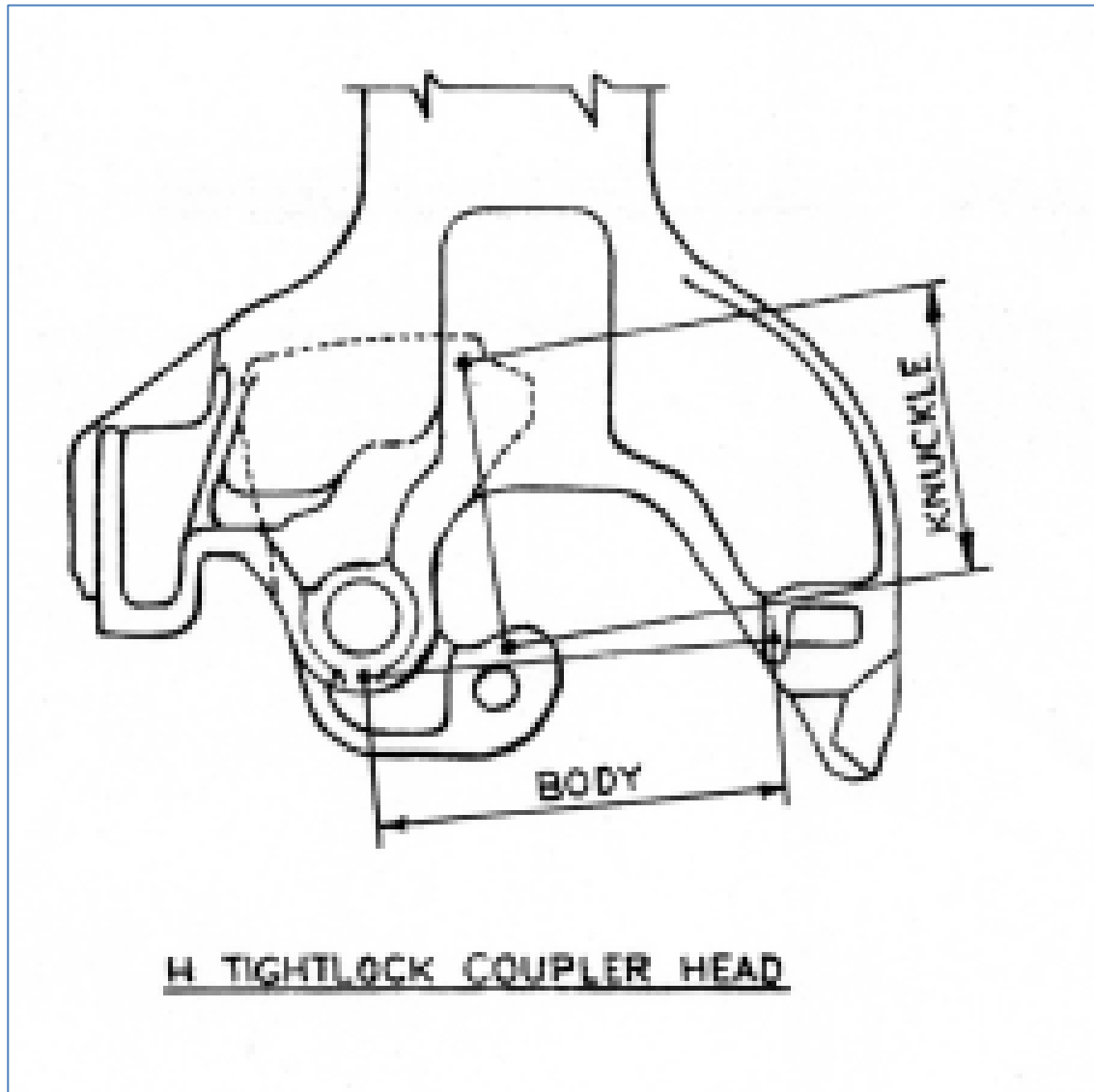


Annexure-C

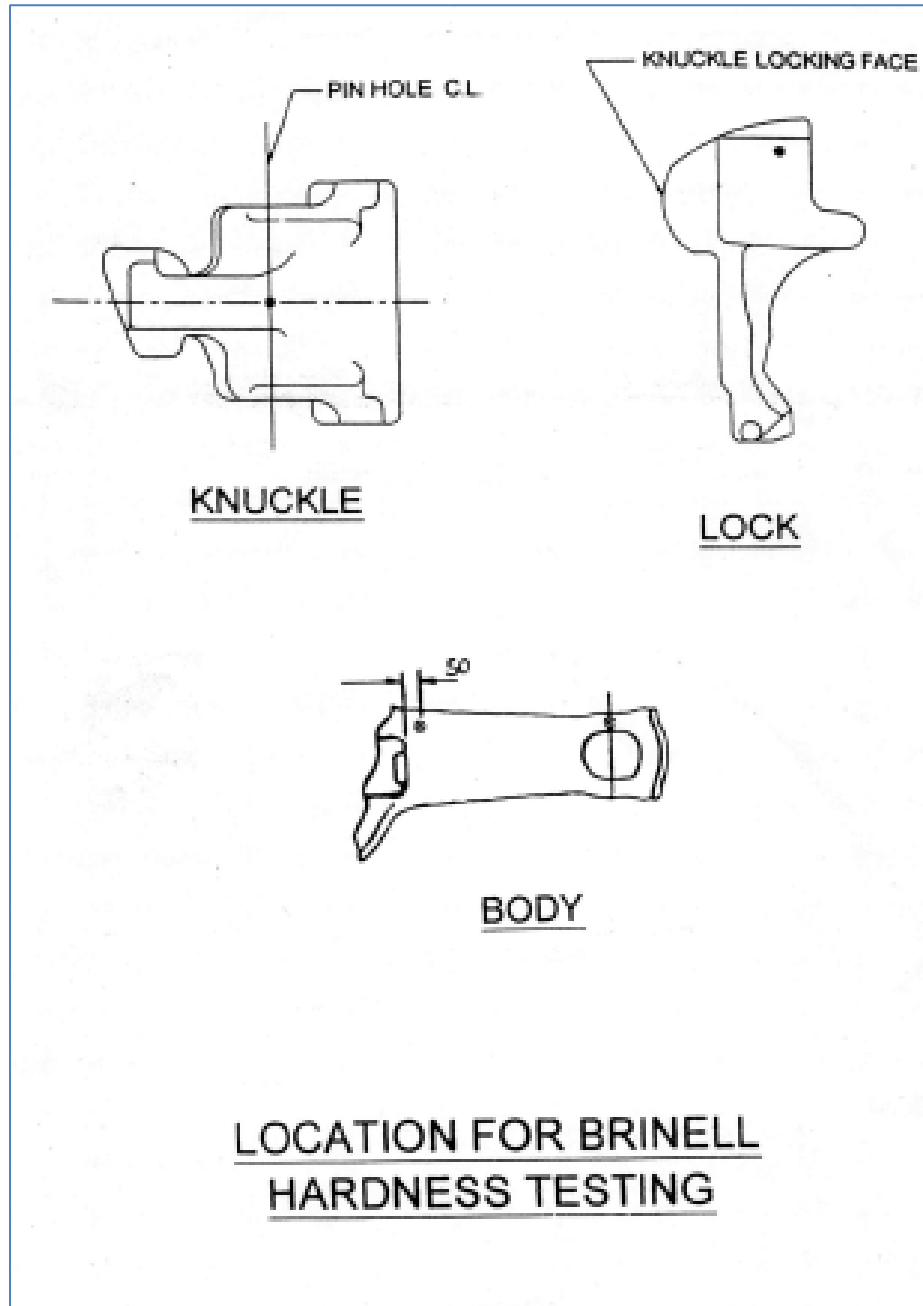
Particulars of Draft gears used on Broad Gauge IR locomotives

Draft gear type & Yoke	Capacity	Draft gear pocket length	Remarks
Cardwell's Mark-50 & yoke as per item 18 of SK-62724 (AAR standard Y45AE)	5385 kg.m (52.7 KJ)	625.5 mm	Currently used on Broad gauge IR locomotives (Other than GM locomotives)
Minor's RF-361 & Yoke as per item 18 of Sk-62724 (AAR standard Y45AE)	5725 kg.m (56 KJ)	625.5 mm	Currently used on broad gauge IR locomotives (Other than GM locomotives)
M/s Keystone's MS-488 6A draft gear & 48165-1 Yoke	3829 kg.m (37.5 KJ)	295.275mm	Used on WDP4 PAC GM locomotives

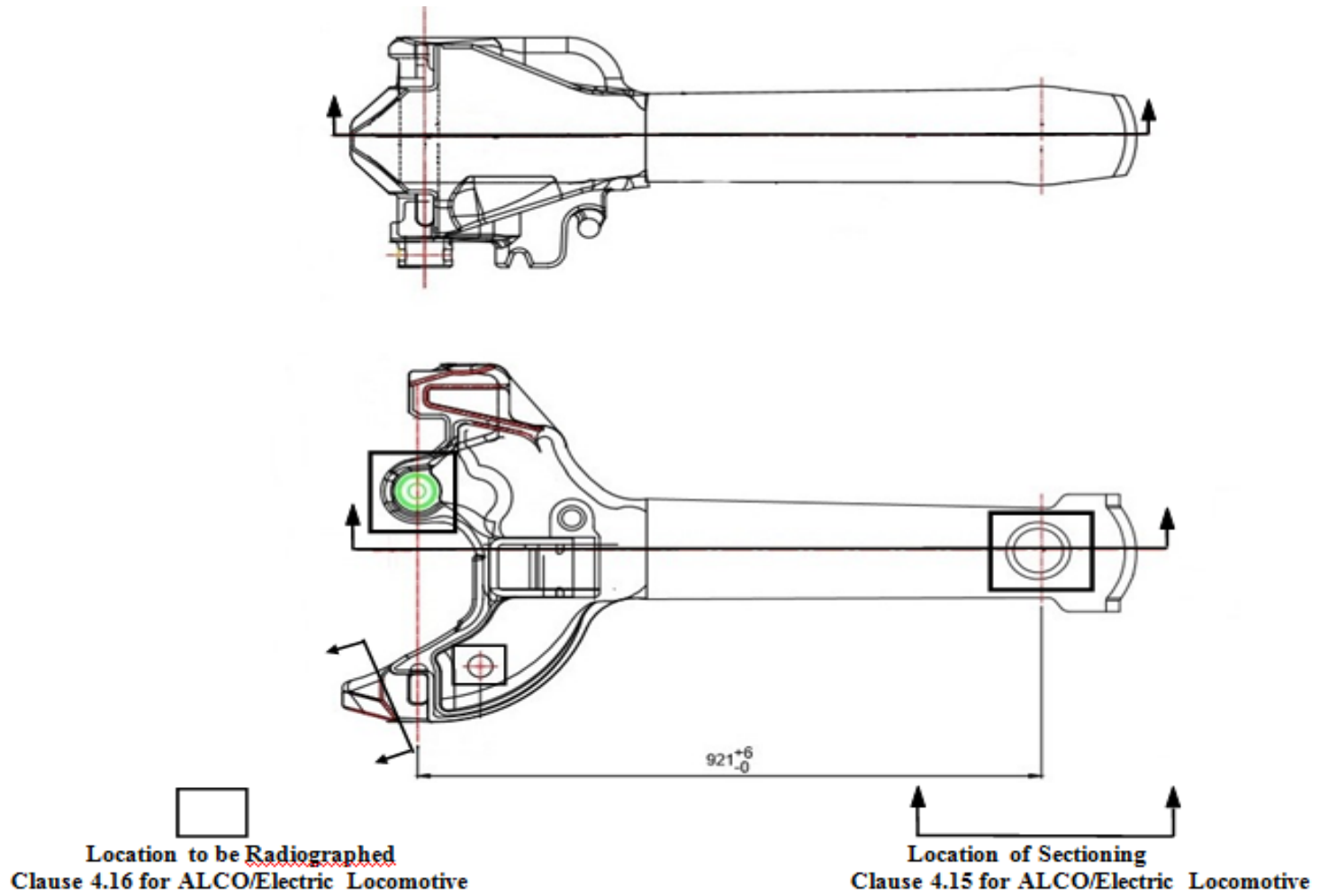
Annexure-D



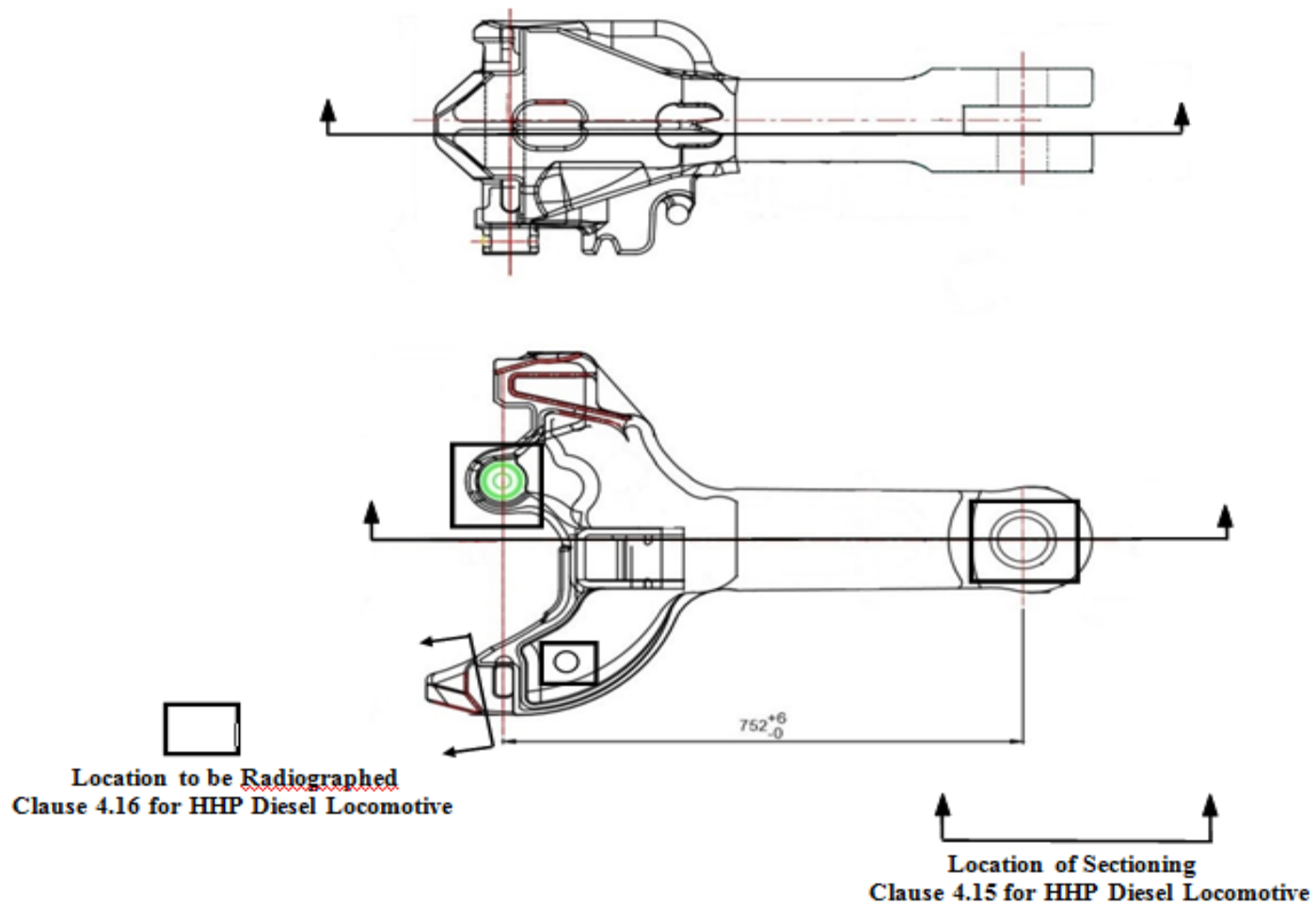
Annexure-E



Annexure-F



Annexure-G



Annexure-H

