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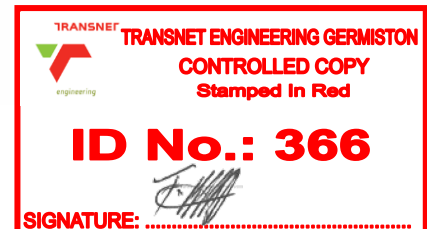
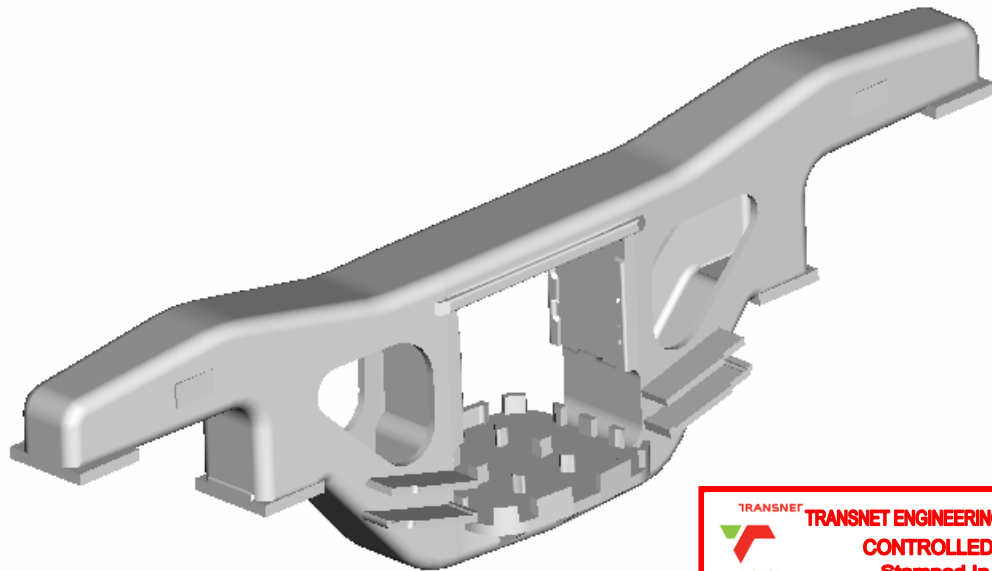
**Specification No. RSE/TE/SPC/0048**

**Specification For The**

**Manufacture of a Side Frame**

**for a 26/30 ton/axle Type**

**HS Mk V Bogie for Freight Wagons**



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**TRANSNET FREIGHT RAIL - TECHNOLOGY MANAGEMENT**

Document no: RSE/TE/PRO/0048 Rev: **03** Page Issue date: 26 March 2008


Page ii of ii

**SCHEDULE OF AMENDMENTS**


<b>Amendment No.</b>	<b>Section Amended</b>	<b>Summary of Amendments</b>	<b>Date Issued</b>
03	various	Prototype, radiography, surface finish, markings, critical areas and requirements	26-03-08

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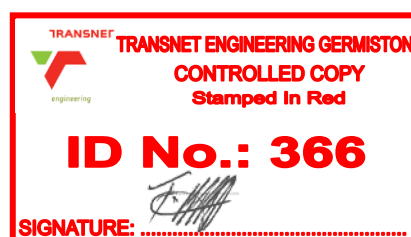
**TRANSNET FREIGHT RAIL - TECHNOLOGY MANAGEMENT**

<b>File Ref.:</b> <b>S.T (RE)</b> <b>15/8/1/2/3</b>	<b>Specification for the Manufacture of                  a Side Frame for a 26/30 ton/axle                  Type HS Mk V Bogie for Freight                  Wagons</b>	<b>Document no:</b> <b>RSE/TE/SPC/0048</b>  <b>Amendment Date:</b> <b>26 March 2008</b>
<b>Compiling/                  Approving                  Officer:</b>  <b>K.M. de Vos</b>  <b>Bogie Technology</b> <b>Signature:</b> 		<b>Document Rev. no: 03</b>  <b>Issue date:</b> <b>20 May 2004</b>
		<b>Page 1 of 1</b>

**CONTENTS PAGE**

List of contents

	<b>Page No.</b>
<b>1.0 Scope</b>	<b>2</b>
<b>2.0 General Tendering Requirements</b>	<b>2</b>
<b>3.0 Design Requirements</b>	<b>2</b>
<b>4.0 Verification of Design</b>	<b>2</b>
<b>5.0 Other Specifications</b>	<b>4</b>
<b>6.0 Crack Detection</b>	<b>4</b>
<b>7.0 Surface Finish</b>	<b>4</b>
<b>8.0 Radiography (X-ray testing)</b>	<b>5</b>
<b>9.0 Welding and Welders</b>	<b>6</b>
<b>10.0 Physical and Chemical Properties</b>	<b>6</b>
<b>11.0 Approved Foundry and Machine shop</b>	<b>7</b>
<b>12.0 Approved Suppliers</b>	<b>7</b>
<b>13.0 Quality Assurance</b>	<b>7</b>
<b>14.0 Main Contractors/Sub-Contractors</b>	<b>7</b>
<b>15.0 Final Acceptance</b>	<b>8</b>
<b>16.0 Markings</b>	<b>9</b>
<b>17.0 Drawings/Specifications</b>	<b>9</b>
<b>18.0 Handling and Transport</b>	<b>9</b>



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## 1.0 Scope

The purpose of this document is to specify the requirements for the manufacture of a **side frame** for a 26/30 Ton/axle type HS Mk V bogie for freight wagons.

## 2.0 General Tendering Requirements

2.1 Tenderers must specifically and separately acknowledge, indicate compliance with, or otherwise reply to, comment on, or furnish the information called for as the case may be, against each and every individual clause and sub clause of this specification and all specifications listed hereunder.

2.2 Tenderers are requested to bind, mark, index and cross-reference their replies to the numbering system of this specification.

2.3 Tenderers must furnish with and at the time of their offer, completed and detailed information, comments, data, drawings or illustrations as called for in this specification and it's allied specifications, to enable clear and satisfactory evaluation, comparison and adjudication of their offers.

2.4 Tenderers must draw specific attention to each and every instance or detail in respect of which the components offered by them differ from the requirements of the specification and supply complete and detailed information on all such differences.

2.5 Any such deviations from the specification and/or drawings must constitute alternatives to the basic offer.

2.6 In addition to offers, which do comply with the requirements of the specification, tenderers may also offer, as alternatives, variations of details, which they consider, might be acceptable to Transnet Freight Rail..

2.7 Failure to comply fully with any of the requirements may result in a tender not being considered for adjudication.

## 3.0 Design Requirements

3.1 The side frame assembly must be manufactured in accordance with drawing CME 68/12728-558/latest (Side frame item 1 and wear plate item 2)

## 4.0 Verification of Design

4.1 **Side frame** (item 1 on assembly drawing no. CME 68/12728-558/latest), casting drawing no. CME 116/12-558/latest.

4.1.1 The side frame must comply fully with the dimensional and other requirements as stipulated on the abovementioned drawings.

4.1.2 Gauges for the critical dimensions are listed on drawing numbers CME 116/12-558/latest and CME 68/12728-558/latest.

4.1.3 All measuring instruments must have valid calibration certificates.



4.1.4 All dimensions not toleranced must conform to drawing CME 4092/0-000/latest.

4.1.5 All dimensions to be gauged. After heat treatment a data sheet with drawing dimensions against actual measurements on the casting and machining must be available on request.

4.1.6 All prototypes, pre-production and production castings and to be **100%** measured.

4.1.7 One casting must be sectioned at the positions as indicated below, to verify the wall thicknesses, inspect for porosity levels, etc. Also refer to clause 8, page 5.

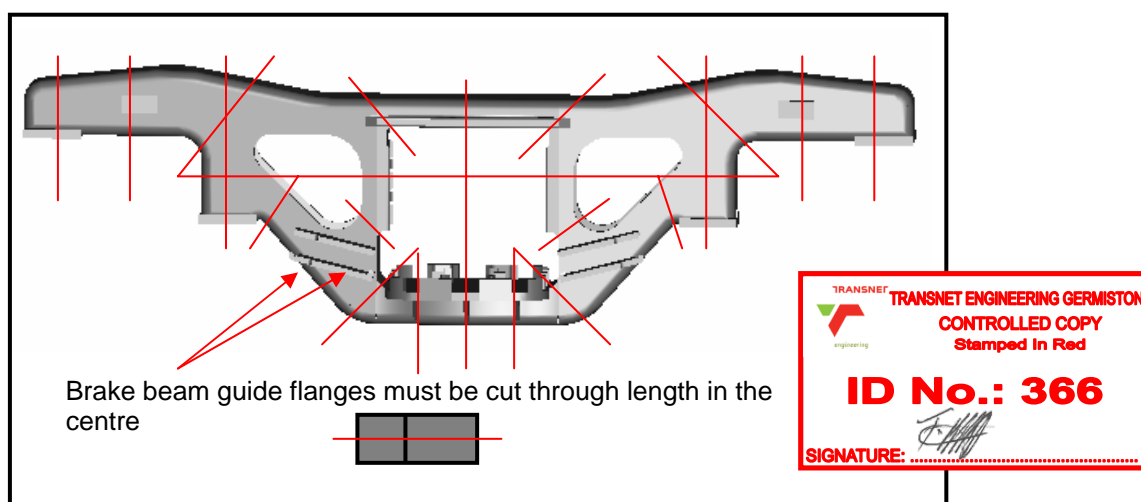


Figure 1 – Sectioned Positions

4.1.8 Some or all of the sections may be redone on a further sample, depending on the results of the first one.

4.1.9. Solidity requirements **must be** as specified in **clause 8.2** of this specification.

4.1.10 As the present design has been tested and approved, theoretical stress calculations, finite element analysis (FEA) and static and dynamic tests will not be required.

**4.2 Side frame wear plate** (item 2 on drawing no. CME 68/12728-558/latest), wear plate drawing no. CME 68/023017-729/latest)

4.2.1 The side frame wear plate must comply fully with the dimensional and other requirements as stipulated on the abovementioned drawing.

4.2.2 The material for the wear plate must be to specification Roq-Last TH400 or HARDOX 400.

4.2.3 Welding must be done to specification RS/ME/PR/065/Latest. (Welding procedure for welding ROQ-Last TH400 or HARDOX 400 wear plate to the side frame).

**4.3 Where this specification is in conflict with AAR M-210 this specification must be worked to.**

**5.0 Other Specifications**

5.1 The specifications listed below are incorporated and made part of this specification: -

- ❑ AAR M-201/latest, Grade "B": Material specification
- ❑ ASTM E446/E186/Latest: Standard Reference Radiographs for Steel Castings Up to 2 inches (51mm) in Thickness.
- ❑ ASTM A802/802M/latest: Standard Practice for Steel Casting, Surface standards, and Visual examination.
- ❑ ASTM E709/latest: Standard practice for magnetic particle examination.
- ❑ ASTM E269/latest: Standard definitions for terms relating to magnetic particle inspection.
- ❑ ISO 9712/latest: Non-destructive testing - Qualification and certification of personnel.
- ❑ ASME V/latest: Article 7: Magnetic Particle Inspection.
- ❑ ASTM E165/latest: Standard practice for liquid penetrant inspection method.
- ❑ ASTM E270/latest: Standard definitions of terms relating to liquid penetrant examination.
- ❑ ASME/latest Article 6: For liquid penetrant examination.
- ❑ W435/latest: Spoornet Quality Assurance specification
- ❑ RW/TE/PRO/0068. - Welding procedure for the welding and repair welding of AAR M201, grade B bogie components
- ❑ RS/ME/PR/065/Latest: Welding procedure for welding ROQ-Last TH400 and HARDOX 400 wear plate to the side frame.
- ❑ AAR M-201/latest: Heat treatment and chemical composition of casting components.
- ❑ ROQ-Last TH400 or HARDOX 400: Material for wear plate.
- ❑ SABS 044/latest or ASME 9/latest: Certification of Welders.



**6.0 Crack Detection**

6.1 Any of the relevant standard liquid or magnetic particle inspection methods can be used for examination of the castings.

- ❑ ASTM E709/latest: Standard practice for magnetic particle examination.
- ❑ ASME V/latest: Article 7: Magnetic Particle Inspection.
- ❑ ASTM E269/latest: Standard definitions for terms relating to magnetic particle inspection.
- ❑ ASTM E165/latest: Standard practice for liquid penetrant inspection method.
- ❑ ASTM E270/latest: Standard definitions of terms relating to liquid penetrant examination.
- ❑ ASME V/latest: Article 6 for liquid penetrant examination.

6.2 A **100%** inspection must be performed on all the prototypes and pre-production castings.

6.3 On production castings 100% on critical areas and visual inspection on the rest of the casting.

6.4 No cracks and hot tears will be allowed in the casting. Surface defects bigger than the requirements in Table 1, page 5 will also not be allowed in any of the castings.

**7.0 Surface Finish.**

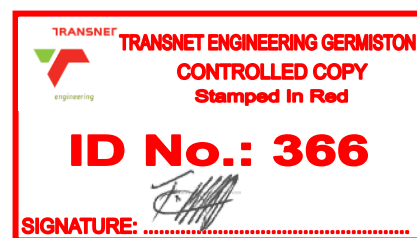
7.1 All surface finish evaluations must be done to specification ASTM A802/802M/latest.

7.2 **NB:**Castings must not be painted. (See **clause 18.3** for protection in the event of the castings being imported)

7.3 All castings must be visually inspected and adhered to the minimum requirements laid out in Table 1 below.

**TABLE 1:** Visual inspection acceptance criteria

Surface Feature	Level 1	Level II	Level III	Level IV
Surface texture		A2		
Non metallic inclusions		B2		
Gas porosity	C2			
Fusion discontinuities		D1		
Expansion discontinuities			E3	
Inserts			F3	
Metal removal marks:				
Thermal	G1			
Mechanical		H3		
Welds	J1			



7.3.1 The acceptance level of E3 level III agreed to with a rider that important areas to be free of expansion discontinuities.

7.3.2 The acceptance level of F3 level III agreed to with a rider that critical areas to be free of inserts.

7.4 Fettling must be controlled to ensure that no undercutting occurs. Metal may not be burnt.

**8.0 Radiography (X-ray testing).**

8.1 The castings will be subject to specification **ASTM E446/E186/latest** for internal defects.

8.2 The acceptance level will be to **level II** in critical areas and **level III** in non-critical areas. An acceptance level of **IV**, in the **non-critical areas** will be considered depending on the location of the defect. These cases must be referred to Transnet Freight Rail Technology Management for approval. These levels are all applicable to the final product after machining.

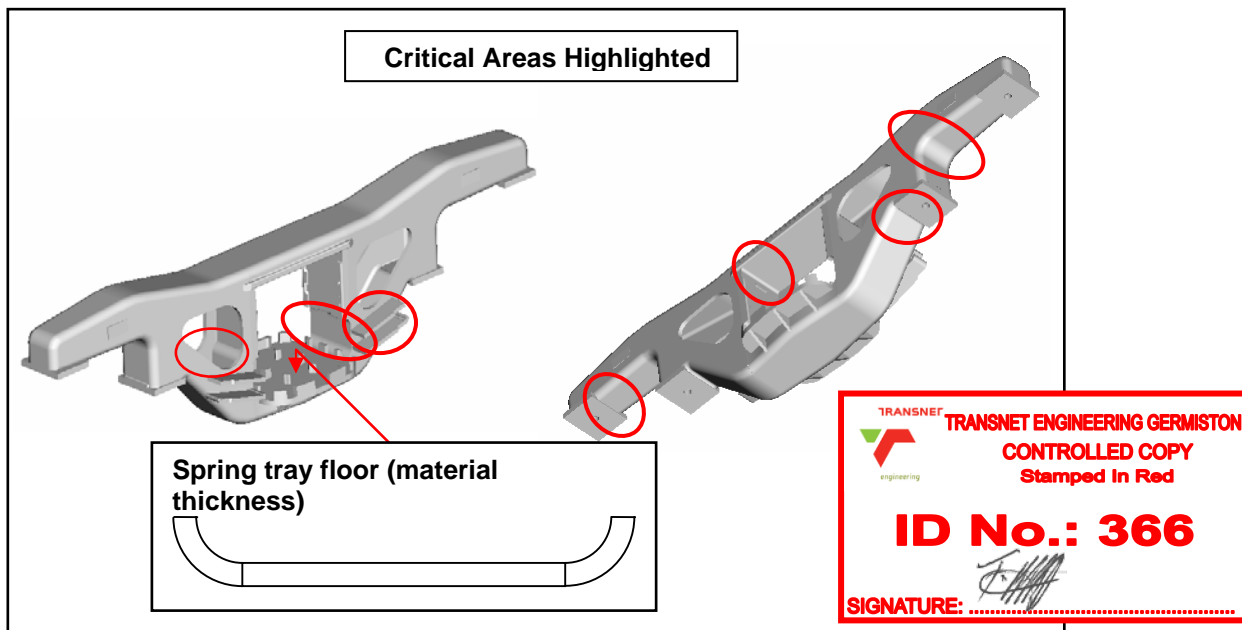
8.2 .1 Two **prototypes** are required for evaluation. One un-machined and sectioned as per **clause 4.1.7** and one fully machined. Prototypes must be submitted for approval with the documentation requested in **clause 15.3**.

8.3 The first **5** sets of **production castings** must be **100%** radio graphed (complete casting) and thereafter **2 %** (critical areas only) of the production castings, with one of the worst of the **2%**, cut up as per specification (**see clause 4.1.7**). Should this one fail, another one of the selected castings must cut-up. Should this one fail then the batch is to be rejected. Selection of the **2%** should be from the batch when **50%** of the castings have been manufactured. The report must be forwarded to Transnet Freight Rail Technology Management and Transnet Rail Engineering (Quality Assurance).

8.4 Pentameter to be used for sensitivity measurements. Sensitivity level must be 2%.

8.5 Radiographs plus interpretation must be available before any approval can be given.

8.6 Further discussions will be held with the successful tenderer/s to finalize the position critical areas.



## 9.0 Welding and Welders

9.1 Repair welding is only permitted on the castings **before** final heat treatment.

9.2 All welding to be performed to Specification RW/TE/PRO/0068.

9.3 Welding of wear plate to side frame must be performed to Specification RS/ME/PR/065/latest and to drawing CME 68/12728-558/latest, and can be done after heat treatment.

9.4 All welders to be certified in accordance to specification SABS 044/1983 or ASME 9/latest.

## 10.0 Physical and Chemical Properties

10.1 All mechanical properties to conform to specification AAR M201/latest for grade "B" material.

10.2 First 5 sets of blocks of the production castings to be fully analyzed with keel blocks being fully traceable, thereafter one keel block per cast for mechanical properties. (Blocks must be available for retest.) The low melting elements such as Tin, Zinc and Lead must be analyzed for as well. The total percentage (%) for these elements may not exceed **0.07%** for retest.)

10.3 One fully machined casting with keel block as well as the cut-up casting (see **clause 4.1.7**) must be made available for analysis and dimensional verification.



10.4 The chemical and mechanical properties of the casting must conform to specification AAR M201/latest.

10.5 The chemical composition of the casting must conform to specification AAR M201/latest.

10.6 A full data pack of the 5 keel blocks and the X-rays must be supplied with the samples mentioned in **clause 10.2**. (Also refer to **Clause 15.3** in this regard)

### 11.0 Approved Foundry and Machine shop.

11.1 Only Transnet Freight Rail and Transnet Rail Engineering approved foundries and machine shops will be accepted.

11.2 Transnet Freight Rail and Transnet Rail Engineering reserve the right to conduct audits where necessary.

### 12.0 Approved suppliers

12.1 SCAW Metals in South Africa is the only approved supplier.

12.2 Approved suppliers do not have to re-submit samples for analysis. But all other conditions apply.

**12.3 Firms approved, must fully comply with the latest drawings and this specification. This specification could have amended requirements to the previous approved castings.**

12.4 All other Tenderers must comply fully with this specification.

### 13.0 Quality Assurance

13.1 Transnet Rail Engineering's Quality Assurance Officers must inspect the components that are locally manufactured, before delivery. Components that imported will be inspected on delivery.

### 14.0. Main Contractors/Sub-Contractors

14.1 The contractor must not sub-contract any part thereof without the prior written consent from Transnet Rail Engineering and Transnet Freight Rail Technology Management, except where otherwise provided for in the contract. Such consent, if granted, will not relieve the contractor from any liability or obligation as stipulated in the contract.

14.2 It is the contractor's responsibility to ensure that all sub-contractors comply with this specification.

14.3 Transnet Rail Engineering and Transnet Freight Rail reserve the right to refuse a certain sub-contractor from involvement in the contract if such sub-contractor is considered not competent to manufacture goods for the contractor. Such firms may be audited if deemed necessary.

14.4 The contractor must ensure that each manufacturer has available at their works a full set of gauges, test equipment and instruments required for inspection/measuring and testing of



material. All measuring and test equipment must be calibrated at least bi-annually. Calibration must be traceable to international standards.

14.5 The contractor must ensure that each manufacturer provides, calibrates and maintains all gauges, measuring and test equipment necessary for the execution of the contract in compliance with this functional specification.

14.6 Should the Transnet Rail Engineering and Transnet Freight Rail representative find, during inspection/auditing or testing that the material accepted by the manufacturer is not in conformance with the relevant specification and/or drawings, or that such material has been measured by defective measuring equipment, all other material, on the premises of the manufacturer and that which has already been dispatched, of this type may be rejected by the representative of Transnet Rail Engineering and Transnet Freight Rail.

14.7 The manufacturer must under these circumstances re-inspect / retest all such rejected material and must not put such material to any use until such time as the material concerned has been accepted in writing by the QA representative of Transnet Rail Engineering.

**15.0 Final Acceptance**

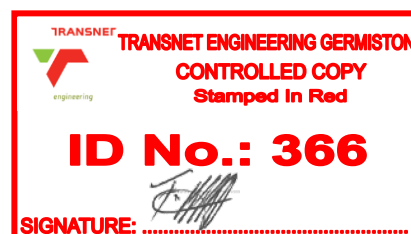
15.1 Transnet Freight Rail and Transnet Rail Engineering will approve the final product.

**15.2 Also refer to Clauses 12.2 and 3 in this regard.**

15.3 The cut-up sections of the approved prototype must be identified and kept in safe custody for a period of **10** years.

15.2 A data pack containing the following documentation must be submitted before final approval will be given.-

- Photo of the prototype component.
- Photos showing the markings.
- Photos showing the cut-up sections.
- Certificates for the chemical and mechanical analysis.
- A Data Sheet showing conformance to all the dimensional requirements.
- Marked-up drawing showing key to dimensional verification.
- X-ray results.
- Marked-up drawing showing key to radiographs
- Certificate of certification of welding staff.
- Certificate of certification of ISO approval.
- Quality control plan.
- Certificate of surface flaw detection.

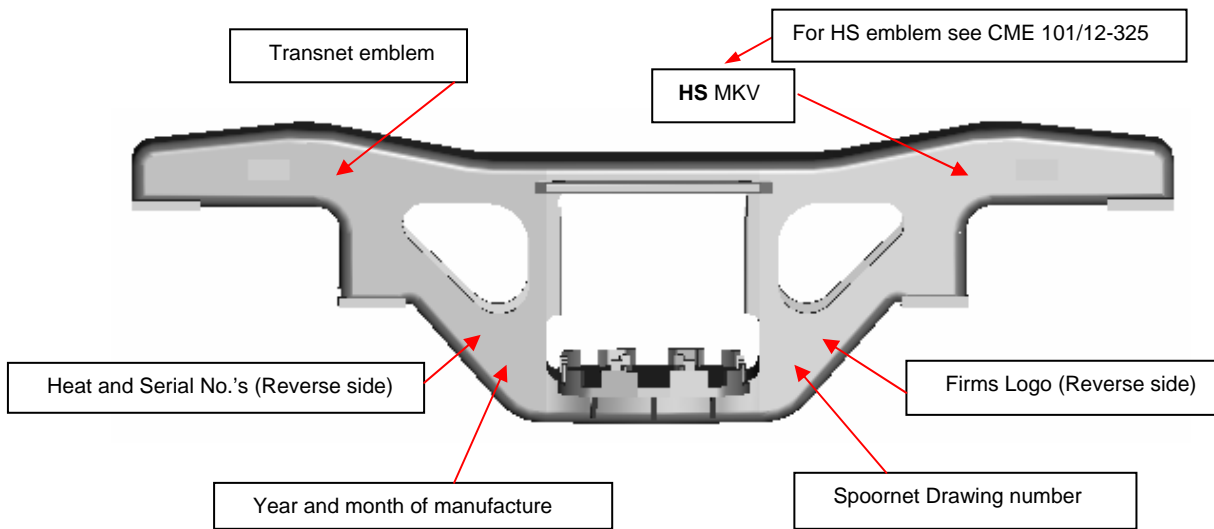


15.4 Each prototype must be numbered and the documentation, specified in **clause 15.3**, must reflect this number.

**16.0 Markings**

16.1 The following markings must identify the casting:

- Transnet Emblem (cast on) **TO BE ISSUED**
- HS MK V (cast on) CME 101/12-325
- Heat No. (Stamped on)
- Month and year (Cast on)
- Serial No. (Stamped on)
- Firm's logo (Cast on)
- Drawing No. (Cast on) CME 68/12728-558

**17.0 Drawings/Specifications**

17.1 The following drawings, and those reflected on the main component drawings (see below), forms part of this specification: -

- Drawing CME 68/12728-558/latest..... Side frame (assembly)
- Drawing CME 116/12-558/latest..... Side frame (casting)
- Drawing CME 68/023017-729/latest ..... Wear plate
- Drawing CME 4092 / 0-000/latest..... General tolerances
- Drawing RS A001\_001\_609/latest..... Spornet emblem
- Drawing CME101/12-325/latest..... HS MK V emblem

17.2 Firms must ensure they obtain the **latest** drawings and specifications/procedures when tendering.

17.3 All outdated copies must be destroyed.

**17.4 Where this specification is in conflict with any drawings then this specification must be adhered to.**

**18.0 Handling and Transport**

18.1 Machining surfaces must be protected against rust.

18.2 All components must be handled and transported in such a manner that no damage can occur.

18.3 The side frames must be protected by applying linseed oil or similar protection for shipment should these side frames be imported.

