



ICTM

WHEELSET AND MATERIALS TECHNOLOGY SPECIFICATION

EVALUATION PLAN FOR SUPPLIERS WHO WISH TO BE LISTED ON TRANSNET FREIGHT RAIL APPROVED LIST OF WHEELSET COMPONENT SUPPLIERS

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1.0 SCOPE

- 1.1 This document contains the evaluation plan and relevant references to specifications and drawings for suppliers of wheelset components who wish to be listed on Transnet Freight Rail Approved List of Wheels Suppliers.
- 1.2 The wheelset components referred to in this document are: axles, wheels and tyres. Approval for one type of component does not imply approval for the supply of all types of components nor does it mean approval to supply different design types of the said component.
- 1.3 The approval will apply for each component and each design of the said components. Approval to supply wheels, for instance, does not imply that the same manufacturer is approved to manufacture and supply axles. For instance again, approval for a certain class locomotive wheel does not mean approval for a certain wagon type wheel. The approval applies to the manufacturer of the components and not to the agent of the manufacturer.

2.0 EVALUATION AND APPROVAL

- 2.1 The evaluation and approval of a supplier who wishes to be listed on Transnet Freight Rail Approved List of Wheel Suppliers must demonstrate their interest by submitting to the phases of the evaluation program as outlined in section 4.0. Upon their application to participate the relevant supplier must submit a folder containing all relevant documents and information as outlined in this section below, including the information as requested in sections 5.1 to 5.4 as indicated in the evaluation program.
- 2.2 Should the supplier have products deemed to be superior to the quality requirements as stated in section 4.0 and 5.0, full details must be submitted for consideration and approval. Experience in supplying wheels to heavy haul railway operators (**axle loads that exceed 25 ton/axle**) will be a recommendation. Evidence of wheels with superior wear resistance under heavy haul conditions will naturally be an advantage.
- 2.3 Transnet Freight Rail is interested in wheel designs that will reduce the mass of wheelsets. This means that **low mass** wheel designs will be a further recommendation. Suppliers acquainted with shrink fitting processes of assembling wheels onto the axle in heavy haul applications are invited to advance their proposals on wheel bore and axle wheel seat tolerances and surface finish for the introduction of this assembly method. A special recommendation will be awarded to suppliers willing to commit to an acceptable performance guarantee. A typical performance guarantee will state the performance of the supplied product under certain conditions.
- 2.4 Commitment in terms of penalties payable for late delivery as well as for non-conformance to performance guarantee or specified properties will serve as a further recommendation.
- 2.5 In order to evaluate the supplier's performance on delivery the following information is required:
 - Lead-time required before delivery of wheels or axles.
 - Delivery time and means of transport.

- Proposed packaging methods.
- Minimum order sizes.
- A list of current customers and details of contact persons.
- Experience in supplying wheels and axles to heavy haul railway operators as well as the track record of such products in terms of wear performance and durability.

2.6 Only suppliers co-operating in the evaluation process and who can convincingly conform to all the requirements stated in this document will be added to Transnet Freight Rail approved list of suppliers of wheels, tyres and axles for traction and trailing rolling stock.

3.0 TRANSNET FREIGHT RAIL QUALITY EVALUATION COMMITTEE

The committee will consist of at least the following members.

- a) VIT (Wheels and Axles) member, TRANSNET FREIGHT RAIL, Rolling Stock.
- b) A representative from Quality Assurance, TRANSNET FREIGHT RAIL, Rolling Stock.
- c) VIT (Non-destructive Testing) member, TRANSNET FREIGHT RAIL, Rolling Stock.

4.0 EVALUATION PROGRAM

All candidates who wish to be listed must demonstrate their interest by conforming sequentially to the phases of the following evaluation program, which is in line with internationally accepted approval plans for new suppliers of critical components such as wheels, axles and tyres:

- 4.1 **Quality Plan** - Submission of a quality plan for wheels, axles or tyres manufactured by them.
- 4.2 **Product Evaluation** - Submission of a test wheel, axle or tyre for metallurgical analysis in terms of Transnet Freight Rail specification. FEA of the proposed new wheel or axle design and the accelerated fatigue test shall be included.
- 4.3 **Process and Quality system evaluation** - If successful in the first 2 phases a site process and facilities audit will to be performed.
- 4.4 **In-service tests** - Once these phases are passed, the candidate suppliers will be provisionally approved for the supply of test wheels, axles or tyres for in-service qualification tests. Only when the in-service tests have been completed successfully, will the manufacturer be placed on the list of approved manufacturers.

See sections 5.1 to 5.4 for the fully detailed requirements for the respective phases of the evaluation program.

5.0 EVALUATION PROCEDURE

5.1 QUALITY PLAN

A quality plan for the manufacture of wheelset components must be submitted. A full

quality plan, conforming to international norms, that includes all critical points in the production process, holding points, monitoring and measuring points etc., is required. The process should be covered from incoming materials to the final inspection and dispatching.

5.2 PRODUCT EVALUATION

- 5.2.1 In order to evaluate the internal quality of the product a test sample of the wheelset component that the supplier proposes to supply for quality evaluation must be submitted. The metallurgical examination will be performed at the expense of the supplier.
- 5.2.2 The response and the acceptability of the samples submitted by a candidate supplier will be evaluated in terms of the specifications and drawings as listed in section 6.0 for the specific wheelset component quoted.
- 5.2.3 Components of the same quality but conform to different specifications will be considered in this evaluation phase. In case of deviation from the Transnet Freight Rail requirements the proposed component quality must be submitted for approval prior to the delivery of samples.
- 5.2.4 Transnet Freight Rail will not perform more than 2 tests per supplier, should the first evaluation turn out to be unsuccessful in the first trial. The costs of the evaluation tests are for the account of the candidate supplier/manufacturer.
- 5.2.5 Additionally all wheel samples shall undergo an accelerated fatigue test as per the requirements of specifications RS/ME/SP/021 and RS/ME/SP/008. This test shall be performed by the supplier/manufacturer in the presence of the Transnet Freight Rail Quality Evaluation Committee.

5.3 PROCESS AND QUALITY SYSTEM EVALUATION

- 5.3.1 A full process description, from steelmaking up to the final product will be necessary in order to assess the risks involved.
- 5.3.2 A description of facilities, machines and personnel applied in the manufacture of wheelset components is required. The level of qualification of personnel used in critical stages of the process must be submitted.
- 5.3.3 A training policy and details of training of personnel must be provided. This quality system must also include full details of non-destructive testing facilities used for the evaluation of wheels or axles or the supplier must provide both. The level of training of non-destructive testing personnel and organisational control of the non-destructive testing department must be supplied.
- 5.3.4 The present level of the accreditation of the Quality System of the supplier must be supplied. This may, for instance, include ISO 9000 series, AAR M1003 or other similar internationally acceptable system.
- 5.3.5 Also to be included in the submitted documentation is the calibration policy of all measuring systems used by the supplier. This should include information on the

frequency of calibration of measuring systems and the standards used.

5.3.6 Process Audit

Based on the outcome of the above process a final audit of the facilities of the manufacturer and its sub-suppliers may be performed, before final approval. An example of a wheel supplier evaluation form, used during the audit, is included with this documentation (see Appendix A). This form is adjusted based on processes used and products supplied by the manufacturer.

5.4 IN-SERVICE TESTS

In-service test will be required only for the following wheelset components: wheel and tyres.

5.4.1 Traction rolling stock:

5.4.1.1 A minimum of **60 wheels/tyres and not exceeding 80 wheels/tyres** are required for a successful completion of in-service test which will run for a minimum of two years at Transnet's Rail network.

5.4.2 Trailing rolling stock:

5.4.2.1 A minimum of **400 wheels and not exceeding 1000 wheels** are required for a successful completion of in-service test which will run for a minimum of two years at Transnet's Rail network.

5.4.3 Following the successful completion of the above steps (phases 5.1 to 5.3); a provisional approval is awarded to these candidates. This means that the supplier is approved for the supply of wheels, axles or tyres for service evaluation.

5.4.4 Upon the successful completion of the service evaluation, without any serious quality problems or failures, the supplier is granted unconditional approval as a wheel, axle or tyre supplier.

6.0 REFERENCE DOCUMENTATION

The test sample of the wheelset component submitted by the supplier for product evaluation (section 5.2) will be evaluated in terms of the following specifications:

6.1 **WHEELS:**

6.1.1 **Cast steel wheels specifications:**

RS/ME/SP/008, Latest Revision

TRANSNET FREIGHT RAIL SPECIFICATION FOR THE SUPPLY OF CAST WHEELS FOR TRAILING STOCK

RS/ME/PR/061 Latest Revision

ULTRASONIC TESTING PROCEDURE FOR INTERNAL, SURFACE AND SUBSURFACE DEFECTS IN NEW, WROUGHT AND SOLID CAST STEEL WHEELS

RS/ME/PR/062, Latest Revision

MAGNETIC PARTICLE INSPECTION PROCEDURE FOR NEW, WROUGHT AND SOLID CAST WHEELS

RSE/TE/PRO/0047, Latest Revision

LIQUID PENETRANT INSPECTION FOR WHEELS WITH BLACK SPOT INDICATIONS IN THE WHEEL BORE

Cast steel wheels purchase drawings:

RS A008_001_130_latest

RS A009_001_130_latest

RS A010_001_130_latest

6.1.2 Wrought steel wheels specifications:

RS/ME/SP/021, Latest Revision

TRANSNET FREIGHT RAIL SPECIFICATION FOR THE SUPPLY OF WROUGHT WHEELS FOR TRACTIVE AND TRAILING STOCK

RS/ME/PR/061, Latest Revision

ULTRASONIC TESTING PROCEDURE FOR INTERNAL, SURFACE AND SUBSURFACE DEFECTS IN NEW, WROUGHT AND SOLID CAST STEEL WHEELS

RS/ME/PR/062, Latest Revision

MAGNETIC PARTICLE INSPECTION PROCEDURE FOR NEW, WROUGHT AND SOLID CAST WHEELS

RSE/TE/PRO/0047 Latest Revision

LIQUID PENETRANT INSPECTION FOR WHEELS WITH BLACK SPOT INDICATIONS IN THE WHEEL BORE

Wrought steel wheels purchase drawings:

RS A008_001_130_latest

RS A009_001_130_latest

RS A010_001_130_latest

6.2 AXLES:

6.2.1 Specification:

RS/ME/SP/002, Latest Revision

TRANSNET FREIGHT RAIL SPECIFICATION FOR THE SUPPLY OF AXLES FOR TRACTIVE AND TRAILING STOCK

Purchase drawings:

All traction and trailing stock axles. List too long to duplicate here. Applicable drawings will be supplied on request.

6.3 TYRES:

6.3.1 Specifications:

RS/ME/SP/050, Latest Revision

TRANSNET FREIGHT RAIL SPECIFICATION FOR THE SUPPLY OF TYRES FOR TRACTIVE AND TRAILING STOCK

RSE/TE/PRO/0034, Latest Revision

ULTRASONIC TESTING PROCEDURE FOR INTERNAL DEFECTS IN NEW, ROLLED TYRES

Purchase drawings:

F10

CME 69_01355_818/Latest

T1

CME 69_01444_818/Latest

F28

CME 69_01377_818/Latest

Type D

CME 69_01338_818/Latest

7.0 REVISION HISTORY

Revision date	Revision number	Details of changes	Remarks
October 1998	00	-	
October 2012	02	-	
May 2016	03	<p>3.0 TRANSNET FREIGHT RAIL QUALITY EVALUATION COMMITTEE</p> <p>5.4.1 Traction rolling stock: 5.4.1.1 A minimum of 60 wheels/tyres and not exceeding 80 wheels/tyres are required for a successful completion of in-service test which will run for a minimum of two years at Transnet's Rail network.</p> <p>5.4.2 Trailing rolling stock:</p> <p>6.3.1 Purchase Drawings</p> <p>7.0 REVISION HISTORY</p>	
October 2016	04	<p>Title: EVALUATION PLAN FOR SUPPLIERS WHO WISH TO BE LISTED ON TRANSNET FREIGHT RAIL APPROVED LIST OF WHEELSET COMPONENT SUPPLIERS</p> <p>1.1 This document contains the evaluation plan and relevant references to specifications and drawings for suppliers of wheelset components who wish to be listed on Transnet Freight Rail Approved List of Wheels Suppliers.</p> <p>1.2 The wheelset components referred to in this document are: axles, wheels and tyres. Approval for one type of component does not imply approval for the supply of all types of components nor does it mean approval to supply different design types of the said component.</p> <p>1.3 The approval will apply for each component</p>	

		<p>and each design of the said components. Approval to supply wheels, for instance, does not imply that the same manufacturer is approved to manufacture and supply axles. For instance again, approval for a certain class locomotive wheel does not mean approval for a certain wagon type wheel. The approval applies to the manufacturer of the components and not to the agent of the manufacturer.</p> <p>4.2 Product Evaluation - Submission of a test wheel, axle or tyre for metallurgical analysis in terms of Transnet Freight Rail specification. FEA of the proposed new wheel or axle design and the accelerated fatigue test shall be included.</p> <p>5.2.5 Additionally all wheel samples shall undergo an accelerated fatigue test as per the requirements of specifications RS/ME/SP/021 and RS/ME/SP/008. This test shall be performed by the supplier/manufacturer in the presence of the Transnet Freight Rail Quality Evaluation Committee.</p>	
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8.0 APPENDIX

Transnet Freight Rail

Wheel supplier evaluation – Appendix A, RSE/TE/PRO/0083 rev 02

Wheel supplier:

Address:

Contact person:

e-mail: _____

Tel. _____

Fax. _____

Example of checklist

Wheel design		
<i>Method</i>	<i>Requirements</i>	<i>Remarks</i>
FEA/FEM	RS/ME/SP/021 ch. 5 Mechanical loading Thermal loading Stress levels Rim displacement	
Steelmaking		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Melting	Control of chemical analysis Hydrogen control Degassing Cleanliness	
Bloom/billet manufacturing		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Rolling from ingot <input type="checkbox"/> Continuous casting <input type="checkbox"/>	If ingot – hot topped mould Hydrogen control Temperature control Pass temperatures Cooling Traceability	
Rolling and Forging		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Hammer/Press Rolling Die press	Temperature control Grain size control Cooling control Traceability	
Heat treatment		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Heating Cycle time Quenching Tempering	Temperature control & recording Traceability Uniformity of heating Grain refining Uniformity of quenching Cooling rate control Microstructure control	
Machining		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Wheel bore Wheel tread Web & Boss (machined/unmachined?) Removal of surface defects	Dimensional control Visual examination Traceability	

Technical Site and Process Audit:

Marking		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Hot or Cold stamping?	Details of marking Size of lettering Position of marking on wheel Traceability	
Non-destructive testing		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Magnetic particle inspection	RS/ME/PR/061 rev. 02 Personnel qualifications Calibration and checks System used:	
Ultrasonic testing	RS/ME/PR/061 rev.02 Personnel qualifications Calibration & calibration frequencies Calibration reference standards and blocks Probes & frequencies Scanning method: <ul style="list-style-type: none"> • Multiprobe • Coverage of rim • Recording of results • Couplant used Automated system:	
Certification		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Residual stress measurement in rim	Saw-cut method: <ul style="list-style-type: none"> • Analysis of results • Recording of results Non-destructive method: <ul style="list-style-type: none"> • Calibration • Analysis of results • Recording of results • System used: 	
Quality assurance and certification	Definition of batch or heat of wheels. Number of wheels: _____ Access to works during contract of Spoornet QA representative. Certification required per wheel: <ul style="list-style-type: none"> • Wheel identification • Non-destructive test certificate (MPT and UT) • Traceability to cast or batch. • Hardness • Surface finish of certain machined surfaces. Certification required per batch or heat of wheels: <ul style="list-style-type: none"> • Results as per 	

	RS/ME/SP/021, including.. <ul style="list-style-type: none"> • Chemical analysis • Microstructure (including cleanliness, microstructure, grain size) • Macrostructure • Ultrasonic test results • Magnetic particle results • Tensile tests results • Impact test results • Uniformity of hardness • Hardness survey of all wheels in batch/heat. • Residual stress measurement results. • Wheel dimensions and profile 	
Packing		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Packing methods used	Protection against damage and undue corrosion	
Non conformances		
<i>Method used</i>	<i>Requirements</i>	<i>Remarks</i>
Handling of non-conformances	Evidence of non-conformance system Non-conformance of products delivered to South Africa	