RAIL NETWORK

USER REQUIREMENT SPECIFICATION FOR THE ACQUSITION OF CHECK RAILS AND THEIR COMPONENTS

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Table of Contents

List of Tables

1. Introduction

1.1. Trains travelling through curves generates a centrifugal force. This centrifugal force tends to displace the train laterally outwards. This lateral movement leads to severe side wear and increase the possibility of derailment. To counteract the force, curves are typically designed with a cant. The cant generates a centripetal force that balances the load eliminating any lateral movement. The cant must be designed to a corresponding speed for equilibrium to be achieved. However, the required cant and corresponding speeds cannot always be achieved.

1.2. To mitigate wear on the high leg of curves and reduce the derailment risk where the equilibrium cant or speed cannot be achieved, Transnet Freight Rail (TFR) uses check rails. The check rails guide wheel flanges and restrict any excessive lateral wheel displacement.

1.3. Check rails are located adjacent to the gauge face of the low rail on a curve, and the check rail assembly components include the following:

- Check rail
- Lateral Restraint Bracket
- Baseplate
- Sleepers
- Fastening

2. Scope

2.1. This specification provides the requirement for the design, manufacturing and supply of check rails and associated components to be used on TFR curves.

2.2. The requirements are for check rails to be used in the following applications:

- Curves with a radius of 150 m and less
- Curves situated on a downhill gradient
- Tunnels
- Bridges

2.3. Any requirements for check rail components which are not covered by this specification, shall be designed, manufactured, and supplied in accordance with the relevant TFR specifications, SANS, EN and or ISO standards.

3. Reference Documents

The following documents are to be considered and used as reference:

- BBB0481 Ver. 2 – Transnet Freight Rail – Manual for Track Maintenance
- BBF9104 Ver. 2 – Transnet Freight Rail User Requirement For Turnouts
- BBF9273 Ver. 2.1 – Specification for Rail Fastening Systems.
- BBG8755 Ver. 2 – Specification for Monolithic Pre-stressed Concrete Sleepers Used On 1065mm Gauge Railway Track.
- EN 13674-3:2006+A1:2010 – Railway Applications – Track – Rail: Check rails
- EN 13674-1:2011+A1:2017 – Vignole Railway Rails 46kg/m and Above
- SABS 0100-1:1992 – Code of Practice for Structural Use of Concrete

4. Requirements

4.1. General

4.1.1. Check rail shall be designed to be used on curve track sections with SAR 48-, SAR 57- and 60E1 rail profiles.

4.1.2. The check rails shall be manufactured with grade R260 as per Table 1 of EN 13674-3. Check rails manufactured from grade R350LHT in EN 13674- 1 may also be requested by Transnet.

4.1.3. The required flangeway clearance shall be a minimum of 63mm and a maximum of 83mm.

4.1.4. The check rails shall be easily adjustable and replaceable during maintenance activities.

4.1.5. The check rail shall be designed to adequately restraint generated lateral forces.

4.2. Check Rail

4.2.1. Check rail shall be designed with a 33 C1 profile and manufactured from the steel grades listed in clause 4.1.2 of this specification.

4.2.2. The check rail shall be manufactured with tapered sections at the beginning and end of the profile.

4.2.3. The check rails shall be manufactured with lateral restraint brackets.

4.3. Sleepers

4.3.1. Check rails shall be supplied with dedicated monolithic pre-stressed concrete sleepers.

4.3.2. Geometrical designs for the sleepers (reinforcing size, quantity, and wire positions) are to be approved by TFR before manufacturing.

4.3.3. The sleeper shape, tolerances and dimensions should accommodate the design of the baseplate to be installed on it.

4.3.4. The sleepers shall be casted with shoulders to accommodate rail chairs/check rail baseplate and fastenings.

4.3.5. The concrete sleepers must comply with the following dimensional limits:

Table 1: Monolithic pre-stressed concrete sleeper dimensions

Width (bearing area)	250 mm
Length (min)	2050 mm
Length (max)	2200 mm

4.3.6. The sleepers must be designed to meet the following gauge requirements:

Table 2: Gauge requirement for track on curves with check rails

Radius (m)	**Normal Gauge (mm)**	**Maximum Gauge (mm)**
<135	1090	1105
135-150	1085	1105

4.3.7. Sleepers are to allow for a maximum permissible sleeper spacing of ranging from 650mm to 700 mm.

4.3.8. Sleepers must be designed to resist the bending moments because of the maximum axle loading.

4.3.9. The sleepers must have a minimum concrete strength of 60 MPa or higher to achieve a maximum concrete tensile stress of 3,5 MPa as specified in the SABS 0100-1:1992 to resist the bending moments.

4.3.10. The sleepers must have a maximum permissible compressive stress in the concrete due to the stressing force alone (f_{ci}) of 11,75 MPa.

4.4. Baseplate

4.4.1. The baseplate shall be designed to accommodate the curve stock and check rails.

4.4.2. The baseplate shall be manufactured from mild steel with shoulders to accommodate the fastening.

4.4.3. The decision to design a baseplate that houses both the stock rail and check rail, or just the check rail shall be left to the discretion of the supplier.

4.5. Fastening

4.5.1. The fastening system shall be designed such that it secures the check rails onto the sleepers and baseplate.

4.5.2. The system shall be easily installed and removed during maintenance with tools currently available.

4.5.3. The design of the fastening system shall ensure that it is not prone to theft and vandalism.

4.5.4. Gauge Plate Insulators (GPI's) shall allow for gauge adjustments for the check rail according to the Track Maintenance Manual.

4.5.5. The system shall allow for a 5mm thick rail pad in its compressed state.

4.5.6. The fastening system must allow for a 1mm vertical deflection and ± 0.5mm lateral deflection per 6 million cycles.

4.5.7. The clamping force system on the rail seat must be a 25kN ± 2kN. (If two clips are used ½ of the value quoted must be carried by each clip).

4.5.8. The loading points of the clip(s) must be such that it transfers the clip force(s) evenly to the other components.

4.5.9. The clip/s must still have a clamping force of 25kN ± 2kN after it has been installed and removed 5 times.

4.5.10. Fastening systems that are to be installed within 15km of a coastal area shall have the necessary corrosion protection.

5. Services

The successful bidder shall be required to provide the following services as part of supply:

5.1. Technical personnel shall accompany TFR personnel to assess and measure the designated curve(s).

5.2. Upon assessment of the section, the supplier shall provide a design schematic detailing the curve(s) and check rail system with the bill of material.

5.3. TFR reserves the right to review and approve the design provided prior to manufacturing.

5.4. Develop and manufacture the complete check rail assembly/ system as per the design schematic for the specific curve(s) including all components within the bill of material.

5.5. Supply to TFR the manufactured complete check rail assembly/ system.

5.6. Provide TFR with a comprehensive installation manual for the check rails which includes a list of tools, equipment and skills required.

5.7. Provide technical support to TFR personnel for the assembling and installation of the check rail component(s), or bill of material required on track in the case where only certain components are to be installed.

5.8. Provide TFR with detailed handling documentation at the time of supply.

5.9. Provide TFR with comprehensive proof of experience (in years) in design and manufacturing and supply of check rails or similar scope in reputable railway companies.

6. Quality Assurance and Control

6.1. TFR will conduct quality assurance of the check rails upon delivery and after installation.

6.2. The supplier shall bear the financial responsibility should the products offered deviate from this specification.

6.3. Supplier shall provide TFR with a documented quality and maintenance plan for the check rails once installed.

6.4. The supplier shall provide proof of conformance to the requirements of this specification for all the components listed on the bill of material