

Ref:	NR/L2/TRK/061
Issue:	3
Date:	05 September 2015
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Level 2

Pearlitic Rails

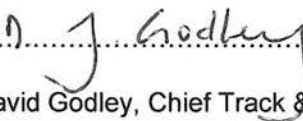
Endorsement and Authorisation

Endorsed by:



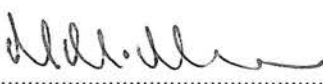
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Authorised by:



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Accepted for issue by:



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User information

This Network Rail standard contains colour-coding according to the following Red–Amber–Green classification.

Red requirements – *No variations, could stop the railway*

- **Red requirements shall** always be complied with and achieved.
- Red requirements shall be presented in a red box **with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of red requirements lies with the Professional Head/Standard Owner.
- Red requirements are monitored for compliance.
- Corrective actions shall be enforced if variations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Amber requirements – *Controlled variations, approved risk analysis and mitigation*

- **Amber requirements shall** be complied with unless variation has been approved in advance.
- Amber requirements shall be presented with an amber sidebar **and with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner, or their nominated Delegated Authority.
- Amber requirements are monitored for compliance.
- Variations **may** be permitted. Variations are approved by the Standard Owner or through existing Delegated Authority arrangements.
- Corrective actions shall be enforced if **non-approved** variations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Green – *Guidance*

- Guidance is based on good practice. Guidance represents supporting information to help achieve **Red** and **Amber** requirements.
- Guidance shall be presented with a dotted green sidebar **and with the word “should” (usually in notes) or as a direct instruction**.
- Guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used. Alternative solutions do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence or documentation.

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Issue record

Issue	Date	Comments
1	Aug 1996	Supersedes GC/ES0127.
2	Aug 2002	Extension of scope to CEN60E1 and related rails.
3	Sept 2015	Requirements aligned to European standards, inclusion of R335HP grade and additional quality requirements, RAG status applied to clauses.

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 05 September 2015.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

Reference documentation

BS11:2015	Specification for dimensional properties and associated tolerances of railway rails
BS EN ISO 9001:2008	Quality management systems. Requirements
BS EN 13018:2001	Non-destructive testing. Visual testing. General principles
BS EN 13674-1:2011	Railway applications - Track - Rail - Part 1: Vignole railway rails 46 kg/m and above
BS EN 13674-2:2010	Railway applications - Track - Rail - Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above
BS EN 13674-3:2006	Railway applications - Track - Rail - Part 3: Check rails
BS EN ISO 14001:2004	Environmental management systems. Requirements with guidance for use
BINDT PSL/44	Vision Requirements
NR/SP/TRK/034	Requirements for Processes for Cold-expanding Fishbolt holes by the Split sleeve Method
NR/SP/TRK/050	Process for Cold-Expanding New Fishbolt Holes by the Split Sleeve Method

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Supply

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1 Purpose

The purpose of this product specification is to define Network Rail's requirements for the manufacture of pearlitic rails and the properties required of the rail.

2 Scope

This specification covers all pearlitic grades of rail steel and the following rail profiles: 56E1, 60E2, 95RBH, 54E1A1, 60E1A1 and 33C1.

The specification excludes the combinations (i) 54E1A1 manufactured from hypereutectoid steel and (ii) 60E1A1 manufactured from hypereutectoid steel.

The requirements of this specification shall be complied with by anyone involved in the supply, purchase, or specification of pearlitic rails.

3 Definitions

For the purposes of this standard, the following terms and definitions apply.

Term	Definition
acceptance test	Test carried out as part of the process and product control system, normally on a heat, sequence or tonnage basis.
check rail	Rail laid close to the gauge face of a running rail which does not carry a railway wheel but ensures, by guidance of the wheel, the safe passage of both wheels of the axle through small radius curves and switches and crossings by not allowing the flange of either wheel to ride up over the running surface of the running rails.
heat	Liquid steel melt tapped out of a converter or electric arc furnace which includes after continuous casting a given number of blooms relating to the weight of the heat and the extension of the mixing zone. In the case of sequence casting the blooms belonging to the mixing zone should be clearly defined.
heat treated rail	Rail that has undergone accelerated cooling from austenising temperature during the metallurgical transformation period.
hypereutectoid rail	Alloyed premium rail steel with greater than 0.83 weight % carbon, for example R335HP rail.
isothermal treatment process	Process whereby blooms are held for a period of time at an elevated temperature for diminishing the hydrogen content. Note 1: For maximum efficiency this is as near to (but below) the pearlite to austenite transformation temperature as is practically possible. Note 2: This process is sometimes referred to as sub-critical diffusion annealing.
pearlitic rail	Rail with a microstructure comprising of alternating laths of relatively soft ferrite and hard, brittle cementite (iron carbide), giving a balance between material toughness and wear resistance.
premium rail	Heat treated and / or alloyed rail steel with enhanced resistance to wear and fatigue compared to grade R260 rail steel, for example R370CrHT or hypereutectoid (R335HP) rail.

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Term	Definition
qualifying test	Special tests and criteria which are relevant to some aspects of the service performance of rails. Acceptance tests also form part of the qualifying tests.
R335HP	As-rolled (not heat-treated) hypereutectoid rail steel grade also known as HP rail.
running surface	Curved surface of the rail head. Area between both gauge corners (transition points of the head inclination and the first head radius).
re-heated rail	Rolled rail that has undergone re-austenisation for heat treatment purposes.
running rail	Profile that is designed to carry a railway wheel.
sequence	Any number of heats, of the same steel grade, which undergo continuous casting in tundishes. Tundishes may be used in parallel if the caster has many strands.

4 Rail supply qualification criteria

Qualification for rail supply will follow Network Rail's product acceptance process. The qualification criteria detailed in this standard form the minimum engineering acceptance requirements for rail supply. The output from a successful qualification process is a supplier-specific product acceptance certificate for the rail grades and sections for which qualification is requested.

4.1 Quality assurance and audit

The rail manufacturer shall operate an independently approved and audited quality management system conforming to the requirements of BS EN ISO 9001.

The rail manufacturer shall operate an independently approved and audited environmental management system conforming to the requirements of BS EN ISO 14001.

Representatives of Network Rail will undertake supplier qualification quality and environmental audits as determined by the Network Rail Supplier Quality Assurance procedure.

4.2 Rail manufacturing process

4.2.1 Process description

The manufacturer shall submit to Network Rail a description of (i) the processes used to manufacture rails from blooms and (ii) the quality management system and process and product control measures used to demonstrate compliance with this standard. Specifically, the following items shall be documented:

- The primary and secondary steelmaking process, including hydrogen control measures;
- The continuous casting process;
- The bloom slow-cooling or isothermal treatment processes used to control product hydrogen levels;