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| **TO** | Network Wide |
| **FROM** | Manager Engineering Services |
| **DATE** | 22 July 2025 |
| **SUBJECT** | ETN-01-10 Technical Note - Use of Step and Junction Weld Kits |

## References

ETS-01-00 Section 1: Rail

ETN-01-06 Weld Quality Management Manual

## Background

Welds performed between two sections of rail with different height or size creates significant stresses through the foot of the rail. Where imperfections appear through these zones the stresses will concentrate and can create localised defects. These defects are very unlikely to be detected through continuous testing due to their location and size, often they only become known once a rail break occurs.

To manage this risk, weld kit manufacturers produce specialised kits for welding dissimilar sections of rail.

The best practice is to eliminate this risk is using junction rails (to transition between rail sizes) and transition rails (to transition between different wear of the same size rail).

## Scope

This extract shall serve as an addendum to list of currently approved junction rails, with additional conditions as described below.

## Definitions

| Term | Description |
|---|---|
| Step Weld | Rail weld using a specialised weld kit used for welding rails of the same size (e.g. 60kg to 60kg) where there is a mismatch in rail wear (e.g. new rail to 10mm worn) |
| Transition Rail | Machined rail of a uniform size (e.g. 60kg) transitioning head wear across its length from new to worn that can be cut at the appropriate length to match height at each end.<br>Used for welding rail of the same size with differing wear. |
| Junction Weld | Rail weld with a specialised weld kit used for welding rails of the different rail size (e.g. 60kg to 53kg) |
| Junction Rail | Specially forged rail with different rail sizes at either end (e.g. 60kg to 47kg) allowing two sections of different size rail to be welded together using standard weld kits at either end (e.g. 47kg at one end and 60kg at the other). |

## Rail Welds – Mandatory Requirements

Rails of dissimilar section (either by weight, design or wear) shall only be welded together using the approved welding processes within the limitations provided by manufacturer or appropriate junction rails.

Weld Kit requirements are provided below

| GOLDSCHMIDT | 0 - 3mm | >3 – 7mm | >7 – 11mm | ≥11 mm |
|---|---|---|---|---|
| | Standard Mould | 5mm Step Mould | 9mm Step Mould | Transition Rail Required |

| PANDROL | 0 – 5mm | >5 – 10 mm | ≥11 mm |
|---|---|---|---|
| | Standard Mould | 8mm Step Mould | Transition Rail Required |

Rail shall not be welded where there is a difference in wear of 11mm or more without CER approval.

Where the difference in rail wear is ≥11mm a transition rail or part worn closure shall be used to reduce the step height. If this cannot be achieved seek local engineering advice.

Post weld inspections shall include checking differences in rail heights either side of the weld and ensuring the appropriate kit has been used.

Any new weld not performed using the appropriate kit shall be recorded as a defect and replaced within 28 days.

Where the required step exceeds the weld kit allowance advise shall be sought from the CER as to the best approach to manage the risk.

## Recommendations

Part worn closure rails should be used to match head height with existing rail wherever possible.

Junction rails should be utilised over junction welds as much as reasonably practicable.

Transition rails should be utilised over step welds where possible.

## Existing Welds

Any existing weld identified as not having been performed with the correct kit shall be recorded in the enterprise asset management system as a defect.

Where these welds are in a higher risk location (e.g. adjacent to a bridge) local engineering advise should be sought for prioritisation.

## Weld Kits

Type approved weld kits include supplier and ARTC inventory can be found on the relevant Type Approval Certificate

**NESA-T130 ‘Goldschmidt' (Thermit) Aluminothermic Welding Kits**

**NESA-T136 Pandrol Aluminothermic Welding Kits**