

PANDROL



HWR Process (Head Wash Repair)

OPERATIONS MAINTENANCE MANUAL



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Partners in excellence

HWR Process (Head Wash Repair)

The HWR process can be carried out on the following rail profiles and grades.

There are four HWR kits available, please see below:

- 54E1 / 56E1 (110A/113A) 220 / 260 (Standard Grades)
- 54E1 / 56E1 (110A/113A) HP335 & R350HT (Premium Grades)
- 60E1 (UIC60) 220 / 260 (Standard Grades)
- 60E1 (UIC60) HP 335 & R350HT (Premium Grade)

Note: HWR is now permitted for Flash Butt Weld head repairs providing the new HWR JS (Felted Moulds) are used.

This section provides additional information to that given in form TEF/3003, on the type, size and location of defects that may be removed by the HWR process.

Squat type defects:

- Maximum excavation size (finish ground surface) - 90mm long, full railhead width, 8mm above the lower edge of the head

Squat type defects are defects repaired using the HWR method subsequently found to be defective following NDT, may be re-repaired using the same method.

Wheel burns:

- Only one overlapping repair is permitted (2 x HWR in total)
- The overlap is measured from the edge of the fusion zone 30mm inside the existing HWR
- Maximum length of visibly damaged area - 150mm

Wheel burns are subject to weld straightness check before repair (no dipped joints).

Defect location:

- HWR is now permitted above flash butt welds providing that the new felted HWR moulds are being used
- HWR is not currently permitted above bolt holes
- Where repairs are to be carried out near a bolt hole, the edge of the excavation shall be a minimum distance of 125mm from the edge of the nearest bolt hole measured vertically through the railhead
- Repairs are not permitted where heavy or severe RCF is present, however, repairs may be installed into light or moderate RCF provided that there is a minimum of 100mm of clean rail either side of the proposed repair
- Where multiple defects are to be removed, a minimum distance of 100mm shall be observed between repairs, however, a minimum time of 2 hours shall be observed between finish profile grinding and commencement of the next repair

1. Excavation Procedure

The gas cutting pressures are set at:

- Propane 0.4 bar (Nozzle Type 74-00-62904NFF)
- Oxygen 3.5 bar
- Acetylene 0.4 bar (Nozzle Type 74-00-62904AC)
- Oxygen 3.5 bar

Complete arcs of the gun to warm the rail up. The Excavation process should be made smoothly in one fluid movement. **(See Figure 1)**

To achieve the excavation, Pandrol have developed a special cutting device for the excavation. **(See Figure 2)**

There are different tools available on the market, but if you are using the special cutting device developed by Pandrol, place it on the top of the rail, in the centre of the defect to be removed.

Pandrol's special cutting device uses the underside of the head as a datum and will always leave 10mm of rail head after cutting.

Figure 1:

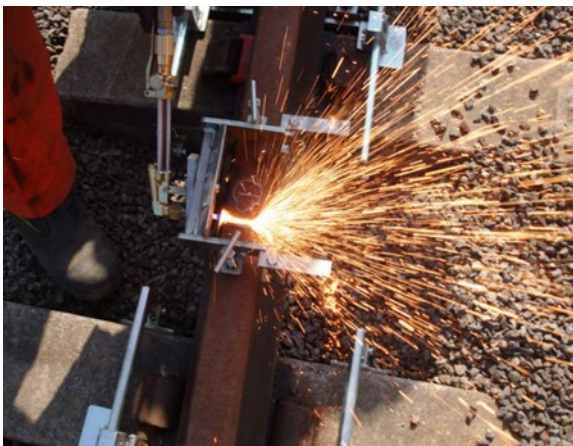
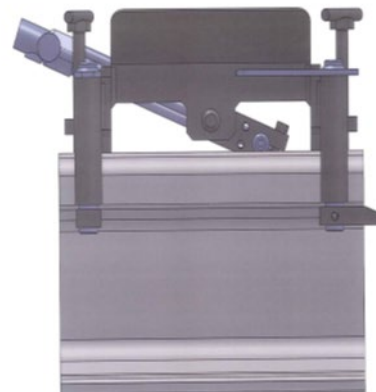


Figure 2:



According to the Network Rail standard, the excavation is made by flame cutting. The geometrical parameters are as follows:

The size of the excavation to be full head width **80mm – 90mm** long maximum excavation after grinding.

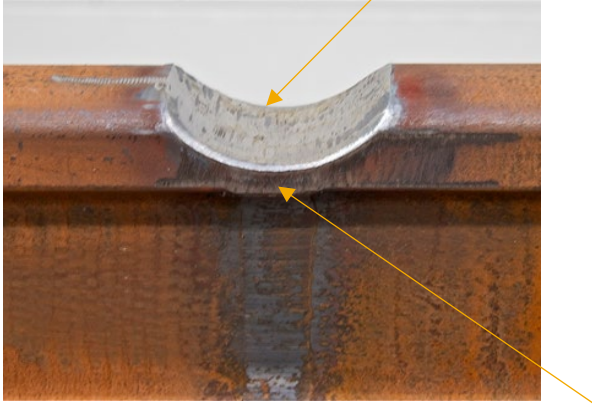
A minimum amount of **10mm** of rail head must remain after flame cutting. **(See Figure 3)**

Figure 3:



The excavation is then ground with an angle grinder to remove any excessive gouging. (See Figure 4)

Figure 4:



A minimum of **8mm** of rail head must remain upon completion of the grinding

1.1 HWR on a Flash Butt Weld (FBW)

The FBW must be inspected to ensure the weld upset does not protrude more than a maximum of 1 mm. However, if the FBW upset protrudes more than 1mm, it will be necessary to grind back the excess FBW metal upset. (See Figure 5)

Figure 5:



IMPORTANT

When grinding the excess FBW metal, please ensure you use a flap type grinding disc only! This is to prevent causing damage to the existing rail.

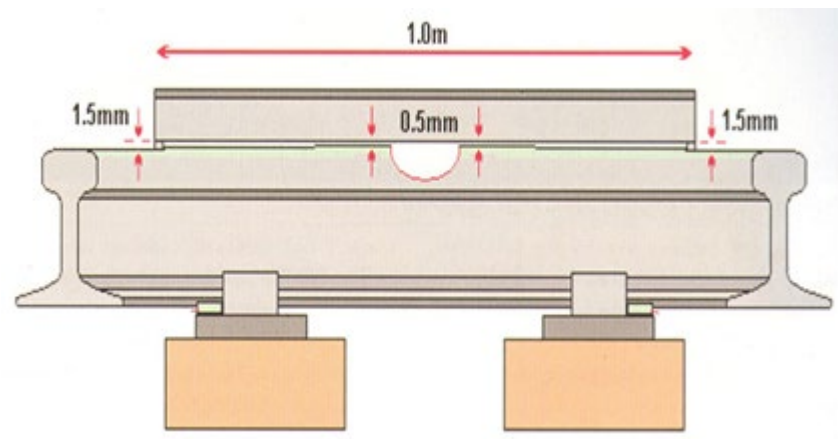
2. HWR Welding Procedure

The rail lifting criteria must be followed to ensure the correct grinding tolerances are achieved on completion of the weld. **(See Figure 6)**

Rail lifting criteria

- Below 100mph = 0.5mm peak over 1m
- Above 100mph lift = 1.0mm peak over 1m

Figure 6:



Once the peak has been achieved, a Non-Destructive Test shall be carried out following the Network Rail standards. **(See Figures 7, 8 and 9 below)**

Figure 7:



Figure 8:



Figure 9:



Once this procedure has been completed, clean the rail and the excavation.

The rail wear shall then be measured by using the rail wear gauge as described in the process manual page 13 or 3.5.1

H WR moulds incorporate the Hybrid Wear System.

The moulds are filled in accordance with the wear measured.

Figure 10:



Modify both moulds to suit the rail wear

Figure 11:



Fit the first mould onto the rail ensuring the mould is central to the excavation.

Figure 12:



The second mould is fitted and clamped together following the standard procedure and checked to ensure the felt is compressed against the rail.

Figure 13:



The gap around the rail head is filled with felt, the same method for Hybrid moulds.

Figure 14:



Both moulds are luted by using Pate A Lute and following the luting procedure described in the full process manual Appendix G.

Figure 15:



The preheater holder is then placed on the top of the rail. The height of the preheater shall be 110mm. Check the preheater for vertically and its alignment within the mould.

Figure 16:



Pressures are the standard pressures used for welding with the PLA process.

Figure 97:



On completion of the preheating, the pre-charged One-Shot Crucible is placed on the top of the moulds and the portion is ignited.

Please see full manual for strip down, Shearing, Cleaning and Grinding times.

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