Engineering Practices Manual

Civil Engineering

Aluminothermic Welds – Identification, recording and reporting

RAP 5391

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1. Scope

This document sets out the procedures for identifying, recording and reporting aluminothermic welds installed in the track and the subsequent procedures for ultrasonic and alignment testing of the weld.

Aluminothermic welds are installed either as part of defect removal that generally requires installation of closures, or as part of rail adjustment. Since both these operations also required recording of information, recording and reporting requirements have been combined into ONE form.

This procedure doesn't include reporting of wire feel welds.

2. Reason and nature of change

Document amended to replace reference to superseded NSW Standard TEP 15 with ETE-01-03 and reference to Rail Fail Form replaced with Rail Flaw Report. Testing of all field welds now to be in accordance with ETE-01-03.

Further amendment to document in clause 5.1 to remove requirement to complete 'Nil Return' if no welds are completed in a particular week.

3. Principles

The following principles have been adopted in this Engineering Practice document:

1. All welds need to be identified to allow testing and tracking of material and welder performance.

2. Rail adjustment and associated trackwork must be recorded to allow auditing of the process.

4. Identification of Welds

To enable welds to be located for testing and configuration management the welder must mark the following information on the inside foot of the rail with a visible, permanent marker:

- Licence Number
- Weld Number,
- kilometrage (as entered on the return)
- Date of weld

5. Reporting

All field welds are to be tested within timeframes specified in ETE-01-03. This applies equally to all welders whether working on maintenance, upgrading or other.

Welds in lines under construction are to be tested within timeframes specified in ETE-01-03 or before traffic begins operation on the line.

To ensure these timeframes are not exceeded the following procedure must be followed.

5.1 Requirement of Welder

Each welder is required to complete, in accordance with this Section 5, a weld return for each weld carried out. This is to be completed on the Weekly Return of Aluminothermic Welding / Adjustment (Appendix 1). The welder must ensure the return reaches the Area Rail Flaw Detection Operator so that the oldest weld recorded is not more than 7 calendar days old when the Rail Flaw Detection Operator gets the report.

It is the responsibility of the welder to ensure the forms are completed and distributed as below:

1. White copy to the Rail Flaw Detection Operator no later than 0800 hours each Monday. If the welder worked in more than one Area in the week, then a separate form is to be completed for each Area.

   Note: As an alternative, the site supervisor at any worksite may require that any welder working on his/her site complete a separate Welding Return for welds installed at the site and hand the White copy of the form to him/her. In this case, the site supervisor must sign in the appropriate places on the form and acknowledge that the form has been taken. The site supervisor then becomes accountable for the delivery of the form to the Area Rail Flaw Detection Operator

2. Green copy to the manager in charge of the welder

3. Book copy to be retained by the welder.

5.2 The Rail Flaw Detection Operator

The Rail Flaw Detection Operator is to test all welds listed on the form, in accordance with the requirements of ARTC Standards ETE-01-03 and ETM-01-01, complete the appropriate section of the form, and return it to the Delivery Manager or nominated representative.

If defects are located, the appropriate Rail Flaw Report or Weld Alignment Failure form is to be completed and forwarded as required.

5.3 Manager in Charge of Welder

The manager in charge of the welder receives the green copy of the form directly from the welder. If the manager is not in charge of the Area in which the welding was carried out, then he/she must sign the form, make a copy, and forward the original immediately to the Delivery Manager or nominated representative for the Area on which the welding was carried out.

The manager in charge of the welder is responsible for:

- Providing the welder with name location and contact details of the Rail Flaw Detection Operator in any area in which the welder will be working
- ensuring a weld return has been completed for each week for each welder
- recording of the welder's defect rate and on-going management of the welder's performance
- ensuring that all the welder's welds have been tested

5.4 Delivery Manager or nominated representative

The Delivery Manager or nominated representative receives the form from his/her welder or from the manager of welders who have installed welds in his/her Area. He/she will monitor the progress of weld testing to ensure that welds are tested within the timeframe specified in ETE-01-03.

When the Rail Flaw Detection Operator has completed testing and has forwarded the completed return to the Delivery Manager or nominated representative, the Delivery Manager or nominated representative will update records of welders under his/her control or forward a copy of the results to the manager in charge of the welder.

The Delivery Manager or nominated representative is to forward a copy of all completed welding returns to the Team Manager.

5.5 Rail Welding Inspector

Collectively ARTC's Team Managers monitor the performance of welders and of welding equipment and consumables. Using the information collated from welding returns and other sources, the Team Managers provide advice to Delivery Manager or nominated representatives on welder performance issues, and to Engineering division on the adequacy of training, Engineering Practices and equipment and material specifications.

5.6 Contract Welders

Where one or more contract welders are engaged the person arranging for the engagement is responsible for the activities of the Manager in charge of the welder (clause 5.3 above) and in addition for ensuring:-

- The welders engaged have a satisfactory weld performance history
- The requirements of clause 5.1 have been completed

The outcomes of the weld testing are forwarded to the company from which the welder was hired.

6. Special Arrangements for Testing

In some cases, such as for new construction work, testing of welds may be carried out by staff within the construction group. Such arrangements are permissible provided that there is a written agreement between the construction group and maintenance organisation and provided the testing and control outcomes in this standard are achieved.

7. Completion of Form

Information is to be provided on the form in accordance with the following guidelines. Codes have been supplied for Weld Reason, Weld type and Site conditions. These are detailed in Section 8.

Information required for completion of form		
Welder's Name	Name of welder or welders. If two (2) welders are working together, a return from only one is required, but both the welders' names must be included on the return. If welds were carried out by welders not associated with the Team Manager's district, this must be noted	
Welder's Licence No.		
Week Ending	Week ending at midnight Sunday	
Supervisor's signature		
Weld Location (welder to complete)		
Date	Insert date of completion of the weld.	
Code	Insert sector code (sector or base) from code listing	
Track	Insert track identifier (only if sector code is used in Code column)	
Km	Km of weld *NOTE: Only ONE weld can be recorded on each line, therefore a closure rail or a Glued Insulated Joint would require two (2) kilometrages, e.g. 93.400 and 93.403*	
Weld Details (welder to complete)		
Rail	U = Up rail and D = Down rail to indicate the rail welded	
Rail Size	Rail size eg 47, 53, 60, 60HH is the existing track rail size	
Weld Reason	Insert code from list (see Section 8)	
Batch Number	Batch number from the weld portion bag	
Weld Number	Weld number from welder identification label	
Weld Type	Weld process code from list (see Section 8)	
Site Conditions	Insert appropriate code from list (see Section 8)	
Punch marks before	Insert length between punch marks before rail is cut	*Must be completed for all welds when RAIL OUT/RAIL IN process is used*
Punch marks after	Insert length between punch marks after rail is welded	
Rail temperature	Temperature of rail at time of weld	

Adjustment (Person in charge of adjustment to complete)	
Km from	Start of the adjustment area (anchor point for this weld)
Km to	End of the adjustment area (anchor point for this weld)
Rail temperature	Temperature of rail at time of adjustment/weld
Measured Rail gap	Actual gap prior to adjustment (indicates state of adjustment prior to new adjustment
Required Rail Gap	Adjustment gap not including weld gap
Add (A) or Remove (R)	Amount of steel added or removed eg A50 means Add 50mm, R25 means take out 25mm
Team Leader to sign	The person in charge of the adjustment to sign
Notes	When CWR track adjustments is completed have creep marks been re-established or installed. Additional information if required.
Associated Work	
Have welds been packed?	If the response is NO for any welds on the form, then additional details are required, including Line No. of weld in question. The person in charge of the welding to sign
Are rail ends & closures crowed to correct curvature?	Have rail ends and closures crowed to give smooth alignment in curves? If the response is NO for any rail ends or closures on the form, then additional details are required, including Line No. The person in charge of the welding to sign
Was track on design alignment when adjusted?	A design alignment should have been established or confirmed prior to the adjustment. Was the track actually adjusted on design alignment. The person in charge of the adjustment to sign. If the adjustment was done off design alignment, the detailed measurements MUST be recorded and attached to the return.
Have creep marks been established or reset?.	For new works Creep Control marks must be established. For re-adjustment control marks need to be reset to zero. Details, including location of creep control marks, whether single or double punch marks are used and the amount of reset should be submitted on a separate sheet. The person in charge of the adjustment to sign.
Testing Details (Rail Flaw Detection Operator to complete)	
Date	Date the weld is tested
OK yes or no	Weld passed = yes or no
Rail Flaw Report (ETE-01-03)	Confirm that a Rail Flaw Report has been completed for this weld defect Defect position and size information is contained on the Rail Flaw Report
Tolerance Exceedent	Number of alignment tolerance form completed for this weld defect Defect type and size information is contained on the Weld Alignment Failure form
Punch Mark Check	Insert length between punch marks

8. Welding Codes

Welding codes	
Description	**Code**
Weld Reason (code)	
GIJ	1
Broken rail / weld (also insert Railfail No.)	2
Switch	3
Stockrail	4
Closure	5
Adjustment	6
Free weld (only when welding shorter lengths in preparation for CWR)	7
Change from one rail size to another eg 53 to	8
Ground out tolerance	9
Broken crossing	10
Rail defect (also insert Railfail No.)	11
Other	20
Weld Type	
SKVF Standard	1
SKVF Head repair	2
SKVF Junction	3
SKVF Wide Gap	4
SMWF	5
PI standard	6
PI JUNCTION	7
PI Wide Gap	8
AP	9
QPCJ	10
PLK one shot	11
PLK standard	12
Site Conditions / Code	
Weld	
Thimble tap too early	1
Weld blowout	2
No problems	3
Other	10
Weather	
Sunny / hot	1
Sunny / cold	2
Intermittent showers	3
Rain	4
Cloudy	5
Other	10
Track	
Good condition	1
Track pumping	2
Poor top	3
Poor alignment	4
Bog hole	5
High rail wear	6
Mismatch rail profiles	7
Other	10

Appendix 1

Weekly Return - Aluminothermic Welding / Adjustment

Note: *Preprinted forms should be printed in "Foolscap*

Welder's Name		*Welder's Signature*		*Date*		*Ultrasonic Operator*	
Licence No.		*Welder's Home Station*				*Name*	
Week Ending		*Supervisor's Signature*		*Date*		*Signature*	

WELDER TO COMPLETE																	**PERSON IN CHARGE OF ADJUSTMENT TO COMPLETE**							**RAIL FLAW DETECTION OPERATOR TO COMPLETE**			
Weld Location					**Weld Detail**												**Adjustment Details**							**Ultrasonic and Alignment Test**			
Line No.	Date	Code	Track	Km	Rail (U/D)	Rail Size	Weld Reason (Code)	Batch No.	Weld No.	Weld Type (Code)	Site Conditions /Codes			Steel in-Steel out			Km		Rail				Team Leader to sign	Date	OK Y/N	Rail Flaw Report Completed Y/N OR Align't Failure No.	**Punch Mark Check**
														Punch Marks													
											Weld	Weather	Track	Before	After	Rail Temp ^{0}C	From	To	Rail Temp ^{0}C	Actual Gap mm	Required Gap mm	Add(A) or Remove (R) mm					
1																											
2																											
3																											
4																											
5																											
6																											
7																											
8																											
9																											
10																											

NOTES

Associated Work		*Signature*	*Comments*
Have welds been packed?	YES NO		
Are rail ends & closures crowed to correct curvature? (where radius is < 800m)	YES NO		
Was track on design alignment when adjusted? If NO, attach Detailed alignment measurements	YES NO		
Have creep marks been established or reset? If NO, attach details	YES NO		