

# **Code of Practice- Welding, Cutting and Repair of Railborne Plant**

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**Synopsis**

This Code of Practice details the matters that should be considered in the carrying out of welding, cutting and repair of railborne plant.

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**Published by  
Safety & Standards Directorate  
Railtrack PLC  
Floor 2, Fitzroy House  
355 Euston Road  
London NW1 3AG**

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# Code of Practice-Welding, Cutting and Repair of Railborne Plant

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**GM/RC2518**

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**Issue One**

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**Date** December 1995

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## **Code of Practice-Welding, Cutting and Repair of Railborne Plant**

### **Part A**

#### **Issue record**

This Code of Practice will be updated when necessary by distribution of a complete replacement.

Amended or additional parts of revised pages will be marked by a vertical black line in the adjacent margin.

<b>Issue</b>	<b>Date</b>	<b>Comments</b>
I	Dec. 95	Original Document, supersedes CE/PI16/07 and supports Railway Group Standard GM/RT2004

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#### **Distribution**

Controlled copies of this Code of Practice should be made available to all people who are responsible for the management of, or the carrying out of welding, cutting and repairs to railborne plant.

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#### **Health and Safety Responsibilities**

In issuing this Code of Practice, Railtrack PLC makes no warranties, express or implied, that compliance with all or any Railway Group Standards or Codes of Practice is sufficient on its own to ensure safe systems of work or operation. Each user is reminded of its own responsibilities to ensure health and safety at work and its individual duties under health and safety legislation.

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#### **Supply**

Controlled and uncontrolled copies of this Code of Practice must be obtained from The Catalogue Secretary, Safety & Standards Directorate, Railtrack PLC, Floor 2, Fitzroy House, 355 Euston Road, London, NW1 3AG.

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## Part B

**1 Purpose** *To define the controls that need to be in place to ensure safety when welding, cutting or brazing activities are used on railborne plant and to ensure that the welds produced are of a suitable quality and size for the purpose. It also indicates some of the precautions that should be taken to ensure that no potential risk is introduced to the Railtrack controlled infrastructure and that the level of safety and safe interworking is not reduced.*

**2 Scope** *The contents of this Code of Practice apply to all manual and partially mechanised welding, cutting and brazing activities on railborne plant for repair, modification or reclamation, where structural components and applications which have a potential to introduce a risk to the Railtrack controlled infrastructure are concerned. Risks to persons carrying out welding, etc. are not specifically addressed in this Code of Practice*

**3 Definitions** **Railborne Plant**  
*Any item of plant variously described as an on-track machine, rail mounted maintenance machine or road-rail vehicle.*

**4 Control of Activities** *The tasks and responsibilities of personnel involved in welding related activities should be in accordance with the requirements of BS EN 719, Welding co-ordination - Tasks and responsibilities.*

*All work should be carried out using safe working practices and be under the control of a technically responsible persons.*

*These persons should take cognisance of the safety advice associated with welding and brazing activities, including amongst others the following HSE publications:*

*CS4, The Keeping of LPG in Cylinders and Similar Containers;*

*GS5, Entry into confined spaces;*

*HSE5, Oxygen: Fire and Explosion Hazards In Use and Misuse of Oxygen;*

*HS(G)5, Hot Work: Welding and cutting on plant containing flammable materials;*

*HS(G)37, An introduction to Local Exhaust Ventilation;*

*HS(G)118, Electrical safety in arc welding;*

*MS15, Welding.*

*In addition, it is necessary to conform to the requirements of:*

*The Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972.*

**5 Competency** *Welders should be trained and suitably competent for the task to be performed. By 1 January 1998, all welders should be approved to BS EN 287, Approval testing of welders for fusion welding, but until this date approvals to former national standards or specifications, including those of British Rail, will remain valid, providing the intent of the technical requirements of BS EN 287 are*

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satisfied and the previous approvals are relevant to the application and work on which they are to be employed. Where appropriate, evidence of regular re-assessment of their proficiency should be made available.

All Non Destructive Testing (NDT) of welding activities should be carried out in accordance with the requirements of GM/IRT2005, Certification Processes for NDT Operatives, Equipment and Facilities Used for Inspecting T and RS (not withstanding the present scope of that document).

Welders and NDT operatives should have been trained in safety aspects of the equipment and processes that they will use.

Welders should be trained in fire safety.

### 6 Equipment

All welding equipment and associated items, together with personal protective equipment should be appropriate for the work to be undertaken and comply with the appropriate national or international standards. Evidence should be available to demonstrate that the equipment is subject to regular inspection and maintenance. Equipment with components providing control or gauges, or alternative means of control or indication, should be included in a calibration system and should be in calibration at the time of use.

All electrical equipment should be correctly earthed. Any cable used should be of adequate section for the application. The insulation of the cable should be in good order and undamaged, to avoid the possibility of stray arcing.

Prior to use, all oxy-fuel gas equipment should be examined and tested to ensure it is safe to use.

### 7 Welding Procedures

All welding covered by this Code of Practice should be undertaken in accordance with approved welding procedures.

All new approvals of welding procedures should be carried out in accordance with the requirements of BS EN 288, Specification and approval of welding procedures for metallic materials.

Current approvals to former national standards or specifications, including those of British Rail, will continue to be accepted, provided they still remain technically relevant. All new welding procedures should be approved to BS EN 288.

### 8 Precautions

#### 8.1 General

Combustible materials such as rubber, textile, timber and plastic should be removed or protected from the heating and sparking effects of welding.

Lifting tackle, drawgear, suspension components, hydraulic equipment, axles, wheel bearings, wheelsets, running rails and electrical/electronic equipment should be protected from weld spatter, stray arcing, heating and welding currents by the use of physical barriers and positioning of welding return leads. On

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*completion of welding, a check should be made for weld spatter or other damage due to welding and if found, appropriate remedial action taken.*

*Where appropriate, any hydraulic or pneumatic system pressure should be released and the system drained.*

*Before any welding is carried out on coated surfaces, consideration should be given to the ventilation of the work area and the supply of any protective equipment required.*

*No person should commence welding, cutting or heating processes on any vessel or tank, if there is any risk whatsoever of its internal atmosphere being explosive and/or toxic.*

### **8.2 Electric Welding**

*Earth/return leads should be positioned as close as possible to the site of welding on a clean surface and be firmly clamped. The earth return lead should not be attached to a wheel, axle, rail, drawgear or different vehicle to the one being repaired, or other areas that may affect the the integrity of the vehicle.*

*Mains and welding leads should not be laid across railway lines.*

*Electric welding should not be undertaken on railborne plant standing on railway lines equipped with track circuits.*

*Electrical interference from welding equipment should not affect the operation of other electrical or electronic circuits, especially track signalling systems.*

*Suitable precautions should be in place to protect persons at the site and in passing trains from the effects of welding arcs.*

*In the vicinity of railway lines, the welding cables may be used taped together, but they should not be allowed to run parallel alongside railway lines for more than 10 metres, due to possible inductive interference with track circuiting equipment.*

### **8.3 Gas Welding**

*To reduce the risks associated with the operation of any oxy-fuel gas system on Railtrack controlled infrastructure, all fitted fuel gas hose assemblies should include hose check valves and flashback arrestors should be coupled to the pressure regulators of oxy-fuel gas systems.*

*The generation of explosive or flammable atmospheres in the vicinity of heat or ignition sources, including passing trains should be avoided. Significant amounts of gas should not be deliberately vented from cylinders (other than "snifting" prior to fitting regulators) and care should be taken to prevent the accumulation of inert, other shielding gases, or heavier than air fuel gases in depressions, culverts, ducts or containments that may result in a safety hazard.*

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*Any oxy-fuel cylinders being used adjacent to railway lines should be suitably secured and prevented from coming into contact with 750V d.c. 3rd rail electrification system or 25kV overhead line electrification equipment. If necessary, an electrical isolation should be obtained.*

*In addition to routine actions to deal with overheated oxy-fuel gas cylinders, escaping gas or uncontrolled burning of gas, action should also be taken to protect passing trains.*

*Fitted hoses should not contain joints and should be limited to a length of 20 metres. They should not be taped, bound, clipped together or laid across railway lines.*

*Suitable means of transporting or manoeuvring gas cylinders should be employed. If cylinders are to be transported across railway lines, suitable yokes designed for the purpose should be used.*

### **9 Design and Materials**

*Materials introduced into the fabrication shall not contain any defects that could result in failure in service.*

*Weld quality must be consistent with the requirements of the design and application to avoid possible failures in service.*

*The effects of welding on the strength, impact properties and fatigue life of the component or vehicle shall be assessed.*

*The procedure shall not introduce cracks or other defects, contamination, excessive residual stresses, or embrittlement into the fabrication.*

*Dressing shall provide a smooth transition, not introduce stress raisers into critical areas and not significantly reduce the material section.*

*Corrosive flux residues shall be removed after welding or brazing operations.*

*No portion of a weld should be deposited closer than 10mm to the edge of a stressed frame member.*

*Where there is a re-occurrence of a failure following a repair, an investigation should be undertaken and where necessary the design amended and the welding procedure amended accordingly.*

*Any failure, including that of a weld, which affects the continued safe operation of the railborne plant or could introduce potential risk to Railtrack Infrastructure shall be advised as required by GM/RT2250 Safety Performance Monitoring and Defect Reporting of Rail Vehicles and Plant and Machinery.*

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### **References**

BS 638	<i>Arc welding power sources, equipment and accessories</i>
BS EN 287	<i>Approval testing of welders for fusion welding</i>
BS EN 288	<i>Specification and approval of welding procedures for metallic materials</i>
BS EN 719	<i>Welding co-ordination - Tasks and responsibilities</i>
CS4	<i>The Keeping of LPG in Cylinders and Similar Containers</i>
GM/RT2004	<i>Rail Vehicle Maintenance and Overhaul Policy</i>
GM/RT2005	<i>Certification Processes for NDT Operatives, Equipment and Facilities Used for Inspecting T and RS</i>
GM/RT2250	<i>Safety Performance Monitoring and Defect Reporting of Rail Vehicles and Plant and Machinery</i>
GS5	<i>Entry into confined spaces</i>
HSE5	<i>Oxygen - Fire and Explosion Hazards in Use and Misuse of Oxygen</i>
HS(G)5	<i>Hot Work: Welding and cutting on plant containing flammable materials</i>
HS(G)37	<i>An introduction to Local Exhaust Ventilation</i>
HS(G)118	<i>HSE Guidance Note : Electrical safety in arc welding</i>
MS15	<i>Welding</i>
	<i>The Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972</i>