

Information for users

The following document:

NR/PLANT/0200/module P501
Issue 1

has had changes made to it, most recently, with effect from **1 May 2014**.

Instructions for use

It is essential that you first read and understand each letter of instruction pertaining to the standard before proceeding to use the standard. You must then apply the requirements of each letter to the standard.

NR/BS/LI/285	Issue 2	11 June 2013	Proceed to letter ►
NR/BS/LI/309	Issue 1	17 September 2013	Proceed to letter ►
NR/BS/LI/327	Issue 2	1 May 2014	Proceed to letter ►
NR/PLANT/0200/module P501	Issue 1	02 March 2013	Proceed to standard ►

For further information, please contact:

IHS Customer Support

Please click here to proceed to the Network Rail Standards' 'Support Contacts' for their latest contact details.

Infrastructure Plant Manual

Module P501 – Systems of work

Acceptable Means of Compliance

Technical content authorised by:

Edward Davison, Senior Policy Development Specialist [Plant and T&RS] | 02/03/2013

Technical content endorsed by:

James Allenden, Professional Head [Plant and T&RS] | 02/03/2013

Accepted for publication by:

Mick McManus, National Standards Manager | 02/03/2013



Contents

0.1 Job roles	3
0.2 Risk mitigation	3
1 Documented safe system of work	4
2 Working of plant without a line blockage	6
2.1 Inside a worksite	6
2.2 Outside of a possession worksite or line blockage	6
3 Working with lines open to traffic	6
3.1 General requirements	6
3.2 Conditions when working with adjacent line open	7
3.3 Fixing the fouling point	7
3.4 Action in event of fouling an open line	9
3.5 Guidance	9
4 Working on gradient and cant	9
5 Working in areas with axle counters	11
6 Working in electrified areas	11
7 Working in poor track conditions	11
8 Working with plant on or in rail vehicles or rail trailers	11
9 Working with on-track machines and on-track plant	12
Appendix A Common causes of accidents	13
Figure 1 The 6 stages of a safe system of work	4
Figure 2 Fouling point calculated by ClearRoute software	9
Figure 3 Example of Type 9b upgraded rail brake system	10
Figure 4 Example of Type 9b with drive hub extensions	10
Figure 5 Example of a 'standard' high ride type machine	10
Table 1 Working ALO - Fouling points (before cant allowance)	8

0.1 Job roles

This module is applicable to the following job roles, you must familiarise yourself with all of the clauses contained within it to understand your personal responsibilities. If you intend to carry out any of these roles you must hold the relevant Sentinel competency:

- Planner
- Lift Planner
- Machine Operator
- Machine driver
- Machine Controller
- Crane Controller
- Maintainer/Fitter
- Slinger
- Banksman
- Portable, transportable and mobile plant operator
- Plant Operator License Holders
- Principal Contractor
- ES
- COSS
- PICOP
- PICOS

0.2 Risk mitigation

This module helps mitigate the following high level risks:

- a) compliance with legislation (LOLER, PUWER, HASAW);
- b) runaway/failure to stop on demand, e.g. OTP running away on a gradient;
- c) MEWPs becoming out of control, e.g. MEWP operator being crushed under a structure;
- d) collision, e.g. collision between a RRV and an OTM;
- e) overturning, e.g. RRV overturning during lifting operations;
- f) damage to assets, e.g. RRV or its load hitting a passing train during ALO operation;
- g) derailment, e.g. trailer being loaded incorrectly;
- h) staff injuries, e.g. Operator being trapped between machine and infrastructure or machine and machine.

Copyright Network Rail

1 Documented safe system of work

A documented safe system of work is required before any work involving plant is undertaken on the infrastructure. Under health and safety law, it is necessary to:

- a) identify the hazards associated with undertaking the work;
- b) carry out a risk assessment of the hazards identified;
- c) prepare a written safe system of work (also known as a method statement or work package plan).

A safe system of work is a formal procedure which shall be documented and followed to make sure that work is carried out safely. There are 6 stages that can be considered when preparing a system of work. All are important as set out in Figure 1 and explained below:

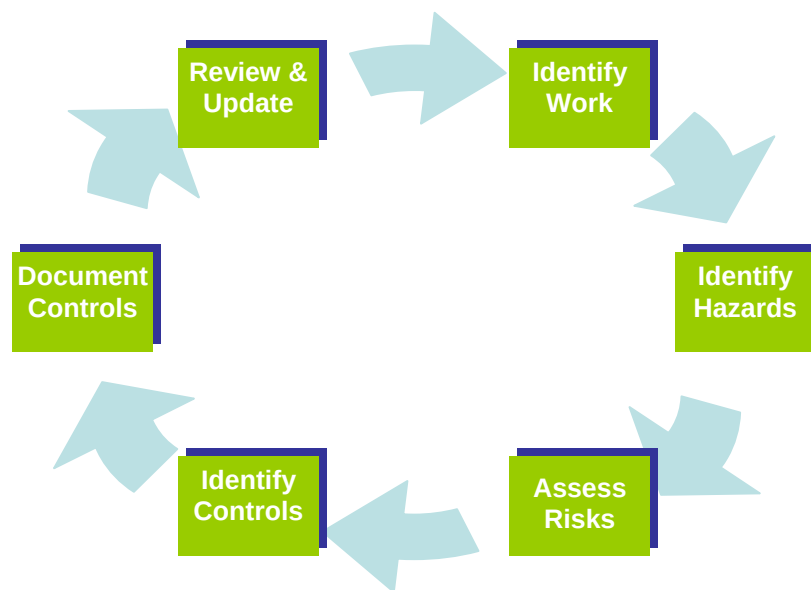


Figure 1 The 6 stages of a safe system of work

Identify work; this can arise from a number of sources but will involve the installation, renewal or maintenance of the railway infrastructure.

Identify hazards; this should consider both the work activities to be undertaken **and** the worksite at which the work will be undertaken. It should include potential hazards from materials, chemicals, equipment or processes.

Some common generic hazards are listed in Appendix A of this module. Other hazards related to the use of plant on the infrastructure may include:

- a) the potential to foul an adjacent line open to traffic;
- b) the potential to strike lineside or overhead equipment or structures;
- c) reduced operator visibility;

The requirements of NR/PLANT/0200/modules P502 and P503 shall be taken into account when planning work on the railway infrastructure.

Assess risks; in assessing the risk, you should consider:

- a) how likely it is that a hazard will cause harm;
- b) how serious that harm is likely to be;
- c) how often and how many persons are exposed to the hazard.

This will help you decide what controls are to be put in place.

Identify controls; your risk assessment will tell you whether normal controls will be sufficient for the generic hazards identified in Appendix A of this module, or whether additional controls are necessary.

You should consider whether you can remove the hazard altogether, or whether a change to the way the work is carried out will make it safer. Your aim should be to make all risks small by adding to existing controls rather than developing new ones wherever possible.

Some common methods of controlling risk are:

- a) replacing a hazardous system of work with a less hazardous system;
- b) provision of adequate training and control;
- c) establishing emergency procedures including first aid on the worksite;
- d) provision of protective equipment, clothing or signs;

NOTE PPE should be used only as a last resort after all other ways of eliminating the hazard have been fully explored.

Other methods of controlling risks related to the use of plant on the infrastructure such as those identified in the section '*Identify hazards*' above are:

- a) providing clearance to the passage of trains and other rail mounted plant on adjacent lines as detailed in Section 3 of this module;
- b) providing warnings to maintain clearance to infrastructure obstructions, (e.g., ground frames, shunting signals, lineside telephones, bridges, platforms, OLE structures and 3rd party power lines that cross the railway);
- c) setting up communication systems between the machine/crane controller and the machine operator as detailed in NR/PLANT/0200/module P505.

Document controls; your safe system of work should record the significant hazards and controls to be put in place as a result of completing the risk assessment for the work to be undertaken. The safe system of work should then be briefed to all persons that may be affected by the work.

NOTE It is recognised that some safe system of work documents are very lengthy. Where this is the case, it is recommended that the document is split into smaller sections for use by individual personnel at the site.

Review and update; your safe system of work needs to be relevant at all times. If it is necessary to change the documented system of work, or there is a failure in the system of work after the task has started, then work should be stopped until the system of work has been changed and re-briefed. Only a competent person is permitted to make changes to the system of work, and any changes made should address any additional or change of risk arising.

2 Working of plant without a line blockage

2.1 Inside a worksite

Plant used within a worksite shall not be left in a position where it could be struck by a train or other vehicle moving on any line.

NOTE The safe system of work for the line under possession will detail how train movements are managed.

2.2 Outside of a possession worksite or line blockage

Plant used outside a possession worksite or without a line blockage shall be under equipment or lookout protection and the safe system of work shall take into account the requirements of *GE/RT8000/HB7 Rule Book; Handbook 7 General duties of a controller of site safety*. If the work could affect track geometry, then the safe system of work shall also take into account whether;

- a) the track can be returned to its original or an acceptably safe state before the passage of a train; *and*,
- b) that any plant and persons involved with the operation can move to a position of safety within the time limits given by the *GE/RT8000 Rule Book* before the passage of a train.

If there is any doubt that the track can be returned to a safe state, and that people and plant can move to a position of safety, a line blockage must be taken.

NOTE Where jacks are used; see the requirements of NR/PLANT/0200/module P515.

Where the operation of plant is mobile along the track, working without a line blockage is only permitted where the movement is defined in the authorised documented safe system of work.

3 Working with lines open to traffic

3.1 General requirements

Working with lines remaining open to traffic shall only be undertaken as a last resort in accordance with the principles of prevention included in the Management of Health and Safety at Work Regulations and The Health & Safety at Work Act 1974 (HASWA).

NOTE This includes delivery/retrieval operations, working, travelling, on/off/cross tracking and manoeuvring activities on Network Rail managed infrastructure.

Where the risk assessment shows that a line can be fouled by the plant and/or its load, work shall be carried out with all affected lines blocked.

Where this is not reasonably practicable then suitable documented risk control measures shall be planned to enable work to take place with lines open to traffic.

The documented planned safe system of work shall be implemented to prevent the plant and/or its load from fouling the lines open to traffic.

A minimum separation between any part of the plant and the fouling point of the nearest open line shall be established prior to work commencing by undertaking a

site specific assessment. Controls shall be implemented such that the minimum separation distance is maintained whilst lines remain open to traffic.

NOTE The fouling point is the closest edge of the maximum combined kinematic envelope of all vehicles that may operate on the nearest line open to traffic.

The site assessment shall be based on and consider:

- a) the machine duties being undertaken correctly;
- b) any load or attachments carried by the machine;
- c) the effects of any likely swinging or rotation of the load.

NOTE Due to effect of passing trains, the safe system of work should consider the implementation of speed restrictions on lines open to traffic.

Always observe the requirements of the machines Engineering Acceptance Certificate (EAC). Where the EAC prohibits operation of the machine with the adjacent line open the machine can not be used in rail mode.

3.2 Conditions when working with adjacent line open

The following conditions apply if you intend to work with an adjacent line open.

- a) Work that cannot foul a line open to traffic, even in the event of human error or system failure will require no further mitigation with respect to the open line.
- b) Work that has the potential to foul an adjacent line will require additional risk controls.
- c) Additional controls shall be put in place if required as part of the overall safe system of work.

NOTE For example, to control risk to staff from passing trains or electrification equipment, or risk to passing trains from disturbance of the ballast.

- d) The Weekly Operating Notice shall include the note:

"Prior to passing out-of-gauge loads, the signaller shall contact the PICOP for permission and the movement shall be made at caution if necessary."

NOTE This is intended to warn signallers who may be required to route trains not normally cleared for operation on the route where the work is being carried out (this could be due to failure, error or planned out-of-gauge operation).

3.3 Fixing the fouling point

3.3.1 Deciding where the fouling point is

The fouling point shall be either:

- a) Estimated as described in Section 3.3.2. This method is used where the planned work **will not** closely approach any lines remaining open to traffic or;
- b) Calculated using purpose designed software as described in Section 3.3.3. This method is used where the planned work **will** closely approach lines remaining open to traffic.

3.3.2 Estimating the fouling point

Where minimum working clearances are not required (i.e. you do not need to work as close as possible to an adjacent open line), the fouling point is estimated as follows;

At the distance shown in Table 1 from the nearest running edge of the open line + An allowance for cant

$$\text{Where; the allowance for cant} = \frac{\text{Working height (mm)} \times \text{cant (mm)}}{1435}$$

NOTE The cant allowance only applies where the open line is canted towards the site of work i.e. where the closer rail is lower than the rail furthest away.

Curve radius (of adjacent line)	Fouling point (before cant allowance)
Straight track	900mm
Curve radius more than 400 metres	1000mm
Curve radius more than 200 metres	1100mm
Curve radius more than 75 metres	1400mm

Table 1 Working ALO - Fouling points (before cant allowance)

NOTE The table is valid for lines carrying conventional UK gauged vehicles, but not UIC GB+ cleared routes (e.g. St Pancras to the Channel Tunnel).

The following is an example of how the fouling point is estimated using the above process.

A road-rail vehicle is planned to work up to a height of 3800mm adjacent to an open line with 550m curve radius and 150mm cant towards the road-rail vehicle.

$$\text{Fouling point before cant allowance} = 1000\text{mm (from Table 1, since curve radius is more than 400m)}$$

$$\text{Allowance for cant} = \frac{3800 \times 150}{1435}$$

$$= 400\text{mm}$$

$$\text{Fouling point} = 1000\text{mm} + 400\text{mm}$$

$$= 1400\text{mm from the nearest running edge of the adjacent open line.}$$

3.3.3 Calculating the fouling point

Where work is required to be carried out close to an open line, the fouling point shall be accurately calculated to confirm that sufficient planned separation will be maintained.

In such cases the fouling point will need to consider the outline of the combined kinematic envelopes of all rolling stock that may operate on the open line, taking into account relative track positions, cant, effects of vehicle roll, wheel tolerances, etc.

An acceptable approach to find the fouling point is to use gauging software e.g. ClearRoute. Use of such software will allow the worst case kinematic envelope to be determined for the work activity and for the rolling stock that may operate on the lines remaining open to traffic. The software may then be used to confirm adequate planned separation exists at regular intervals along the site of work. Figure 3 shows a typical example of a fouling point calculated by this method.