Requirements for the Design, Operation and Maintenance of Points

Synopsis
This document defines requirements for the design, provision, inspection and maintenance of all types of points, including unworked points, derailers and scotch blocks. It includes requirements for the control, locking and detection of points by the signalling system and requirements for points acting as part of the track system. It also includes requirements for points heating.

Submitted by

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Part A

Issue Record

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

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Technical Content

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Responsibilities

Railway Group Standards are mandatory on all members of the Railway Group * and apply to all relevant activities that fall into the scope of each individual’s Railway Safety Case. If any of those activities are performed by a contractor, the contractor’s obligation in respect of Railway Group Standards is determined by the terms of the contract between the respective parties. Where a contractor is a duty holder of a Railway Safety Case then Railway Group Standards apply directly to the activities described in the Safety Case.

* The Railway Group comprises Railtrack and the duty holders of the Railway Safety Cases accepted by Railtrack.

Compliance

The provisions in this document are to be complied with from 03 February 2001 except as noted below.

Section 13.7 (Requirement for standard drawings) is to be complied with from 01 February 2002.

Sections 6, 7, 8, 9.1, 14, 15, 16, 17, 18.4, 18.5 and 19.2 of this document apply to existing points.

Other sections of this document apply where:

- new points are installed or existing points are re-laid;
- the permissible or enhanced permissible speed is increased above 100mph.

Any Railway Group member deviating from the requirements set out in this document shall ensure that the situation is regularised in accordance with the requirements of GA/RT6001, GA/RT6004, or GA/RT6006.
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Requirements for the Design, Operation and Maintenance of Points

Part B

1 Purpose
The purpose of this document is to define requirements for the design, provision, inspection and maintenance of all types of points, including unworked points, derailleurs and scotch blocks. It includes requirements for the control, locking and detection of points by the signalling system and requirements for points acting as part of the track system. It also includes requirements for points heating.

2 Scope
The overall scope of Railway Group Standards is set out in Appendix A of GA/RT6001.

This document contains requirements that are applicable to the duty holders of the following category of Railway Safety Case:

- Infrastructure Controller.

The requirements of this document apply to all worked points and train operated points on Railtrack controlled infrastructure.

Some of the requirements of this document apply to unworked points. These are set out in section 18.

Some of the requirements of this document apply to derailleurs and scotch blocks. These are set out in section 19.

The terms ‘worked points’, ‘train operated points’, ‘unworked points’, ‘derailer’ and ‘scotch block’ are defined in section 3.

Related requirements for the design, inspection and maintenance of Switches and Crossings (S&C) and particular requirements for fixed crossings are set out in GC/RT5011.

3 Definitions
All technical terms used in this document, other than those given below, have the meanings defined in GK/RT0002 and GC/RC5603.

Correspondence
Correspondence occurs when the detected position of all point ends forming a set of points matches the normal or reverse position to which they have been instructed to move by an external command. See also ‘external command’.

Derailer
A device attached to a rail that will, when in its effective position, cause the derailment of a vehicle. It is used to guard against unauthorised movements.

Detection
The proof and indication of the position of the points, normal or reverse, and that, where fitted, the facing point lock is fully engaged.

External Command
An instruction sent to the point operating mechanism by the interlocking to move the point ends to the normal or reverse position.

Facing Point Lock
A mechanical means of physically locking points so that they cannot be moved other than in response to an external command or manual operation. The lock may be provided independently or incorporated into a point operating mechanism.
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Interlocking
Equipment that controls the setting and releasing of signals and points to prevent unsafe conditions arising.

Lock Stretcher Bar
A bar that connects together the two switch rails of a set of switches to maintain flangeway gaps and which also incorporates or is connected to a bolt which locks the switch rails in the normal or reverse position.

Normal and Reverse
The two defined positions of a point end or associated signaller’s control device.

Point Clip
A lockable device to clamp the movable track component of a point end to its associated fixed rail (for example, a switch to its stock rail) to enable the point end to be secured against any movement.

Point End
An item with a movable track component forming one element in a set of points. For the purpose of this document, the term includes a set of switches, one half of a set of switch diamonds, a swing nose crossing, all forms of trap points, a derailer or a scotch block.

Point Operating Mechanism
Equipment for the powered or mechanical movement of points.

Point Operating Time
The time taken from receipt of an external command by the point operating mechanism to release the facing point lock, move the switch rails or equivalent to the opposite position and reapply the facing point lock.

Points
A group of one or more point ends which are operated together by a common external command and may be aligned to one of two positions, normal or reverse, according to the train movement required.

Points Indicator
An indicator that informs the train driver that the associated points are correctly set. Points indicators are sometimes referred to as ‘Points detected normal indicators’.

Primary Drive
The point operating mechanism positioned at the toe of points that provides the movement of the points.

Running Line
A line shown as a running line in Appendix A to the Sectional Appendix.

Scotch
A timber wedge that is placed between a switch rail and a stock or wing rail to prevent the switch rail from closing. See also ‘point clip’ and ‘scotch block’.

Scotch Block
A device attached to a rail that will, when in its effective position, prevent the movement of stationary vehicles.

Soleplate
A steel plate placed on the upper surface of a bearer at the switch toe and below the toe slide chair or baseplate, to provide additional gauge restraint and, where appropriate, rigidly connect the point operating mechanism to the stock or wing rail.
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Standard Drawing
A drawing showing critical dimensions with construction and maintenance tolerances for a generic type of switch, switch diamond or swing nose crossing (for example, a GV switch).

Stretcher Bar
A bar that connects together the two switch rails of a set of switches to maintain flangeway gaps.

Supplementary Detection
An additional detector provided to prove and indicate that switch rails are in the required position at a distance from the switch toes.

Supplementary Drive
A drive provided where necessary in addition to the primary drive to ensure that switch rails or a swing nose crossing are correctly aligned and provide an adequate flangeway gap throughout their length. For the purpose of this document, the term ‘supplementary drive’ includes back drives and supplementary point operating mechanisms.

Swing Nose Crossing
A common crossing in which the crossing vee can move laterally to close the flangeway to one or other of the wing rails to provide continuous support to wheelsets. This type of crossing does not require the use of check rails. A swing nose crossing counts as one point end.

Switch Diamonds
A set of switch diamonds consists of two obtuse crossings in which the obtuse point rails are replaced by switch rails and a check rail is not required. A set of switch diamonds counts as two point ends.

Switches
A set of switches consists of two fixed stock rails with their two associated moveable switch rails. A set of switches counts as one point end.

Switch Securing Block
A block which holds a switch rail open or closed relative to its associated stock rail as required to enable the point end to be secured. It can be locked in position.

Train Operated Points
Points which are designed for use in running lines with facing movements in the normal position only. They are operated by the passage of trains in the trailing reverse direction. They are restored to the normal position by the point operating mechanism after the passage of each train (compare with ‘worked points’). ‘Hydro-pneumatic self restored points’ are a type of train operated points.

Unworked Points
Points not controlled from a signal box or ground frame, other than train operated points. Hand points, runaway catch points and spring operated points (usually only used as trap or catch points) are examples of unworked points.

Worked Points
Points which are controlled by a signal box or ground frame. Worked points generally remain in the position last called, unless special controls are provided to restore them to the normal position (compare with ‘train operated points’).
4 Identification of Points

4.1 Point Identity

Worked points, train operated points and unworked points that are detected in the signalling system shall have an identity that is unique to the controlling signal box.

Points worked by levers shall be identified by the lever number. Other points shall be individually numbered within a logical sequence. The sequence shall be distinct from other functions such as signals and lockout systems. Where practicable, the sequence of numbers for new layouts shall ascend in the down direction. It is permissible to follow established numbering sequences where existing layouts are modified.

Points with two or more ends that are required to be operated together shall be identified by a common identity and a unique suffix for each end. Each signal box shall have a convention for the allocation of suffixes. Where practicable, the suffixes for new layouts shall increment alphabetically in the down direction. It is permissible to follow established conventions where existing layouts are modified.

The rationale for the numbering sequence and the convention for suffixes shall be recorded as part of the signalling design documentation.

Unworked points in running lines that are not detected in the signalling system shall have an identity in a distinct sequence, similar to that for worked points.

4.2 Point End Identification Plates

Where a point identity is required, all associated point ends shall have identification plates or equivalent markings.

The identification plates shall display the point identity and any additional suffix. Point identification plates shall include a signal box or locality code prefix where necessary to avoid confusion.

At each point end the identification plate shall be fixed to a bearer. The plate shall be oriented so that it can be read when looking at it in the same direction as the points are passed over in the facing direction.

Where possible, the identification plate shall be fixed near to the toe of the switch rail that is closed when the points are in the normal position. Where this is not possible or where the intended switch rail is not obvious, the identification plate shall incorporate an arrow pointing to the normally closed switch rail.

At point ends without a normally closed switch rail (for example a trap point with a single normally open switch rail) the identification plate shall incorporate an arrow pointing in the direction of operation for the normal position.

At swing nose crossings, the identification plate shall be fixed next to the normally closed flangeway, adjacent to the crossing nose. The identification plate shall incorporate an arrow pointing in the direction of operation for the normal position.

4.3 Point Operating Mechanism Identification Plates

Each point operating mechanism shall have an identification plate or equivalent marking. The display on the plate or marking shall match the point end identification plates and, where practicable, shall be visible from a position of safety.

Where several independent point operating mechanisms are used to provide the movement of a point end, each point operating mechanism shall be identified by an additional unique numerical suffix. The primary drive shall be given the suffix ‘/1’. Suffixes for supplementary drives shall then increment in the direction away from the primary drive.
5 Control of Points

5.1 Requirements for Worked Points
The interlocking shall command the two point ends of a switch diamond to operate together.

The interlocking shall command a swing nose crossing to operate together with its associated switches.

It is permissible to operate other point ends together where there is an advantage in doing so (for example, provision of inherent flank protection or economy of control equipment). In such cases, the signaliser’s control shall be from a single device. Usually no more than two point ends shall be operated together.

Where it is intended to operate point ends together, consideration shall be given to any secondary hazards arising from equipment failure.

Unusual combinations of points ends operated together shall only be used where they have been subject to a risk assessment.

5.2 Normal position of points
The normal position of points numbered as a crossover shall give parallel movements.

Elsewhere, where reasonably practicable, the normal position of points shall:

• lead a movement onto a line used predominantly in the same direction as the movement or into a siding;
• be arranged to reduce conflicts, for example at double junctions;
• derail vehicles at trap points;
• when the above do not apply, be the straight or main route through the points.

Designation of the position of points in ways other than those listed above shall be subject to a risk assessment.

5.3 Risk assessments required by sections 5.1 and 5.2
The risk assessments required by sections 5.1 and 5.2 shall take into account the likelihood of people maintaining or operating the points making mistakes by misidentifying points and their normal positions.

5.4 Related Requirements in other Documents
Requirements for the interlocking of signals, points and other parts of the signalling system to ensure the safe operation of trains are set out in GK/RT0060 and GK/RT0064.

Requirements for the control of points from ground frames or switch panels are set out in GK/RT0061.

5.5 Requirements for Train Operated Points
No provision is made for train operated points in the interlocking. Routes shall therefore be interlocked directly against each other, since they cannot be interlocked via the points.

5.6 Criteria for use of Train Operated Points
The use of train operated points shall be permitted only where:

• the permissible speeds do not exceed the maximum facing and trailing speeds for which the specific train operated point equipment has been designed and approved;
• the axle loading of all vehicles permitted to pass over the points in the trailing direction without the points being secured is sufficient to ensure safe operation of the points;
Requirements for the Design, Operation and Maintenance of Points

- operation of traffic does not usually include the stopping of trains in a position where they would stand over the points;
- there are no regular running movements in the reverse facing direction.

5.7 Criteria for use of Unworked Points
Unworked points shall only be permitted in running lines where they are trailing in the usual direction of travel.

Hand points shall not be permitted in lines used by trains conveying passengers.

Spring operated points shall only be installed in running lines where they have been subject to a risk assessment.

Limitations on the use of spring operated catch points are set out in GC/RT5021.

6 Operation of Points

6.1 Operation of Worked Points
The point operating mechanism shall only move in response to an external command, other than when manually operated.

The point operating mechanism shall move the appropriate movable track component of each point end (for example, a switch rail) to the correct position and the correct gauge before a train is permitted to pass over a set of points.

The point operating mechanism shall maintain all moveable track components in the required position at all times other than when commanded to move.

6.2 Operation of Train Operated Points
Train operated points shall be operated from normal to reverse by the passage of a train in the reverse trailing direction.

The point mechanism shall maintain all moveable track components in the correct position during the passage of a train in the facing direction.

Train operated points equipment shall restore the switches to the normal position after the passage of a train with suitable damping to prevent damage or excessive rail wear.

Train operated points without a facing point lock shall maintain sufficient closing force on the switches to maintain them in the normal position during the passage of facing moves at speeds up to the maximum facing speed for which they have been designed and approved.

7 Facing Point Locking

7.1 Facing Point Lock on Worked Points
Worked points shall have a facing point lock, other than as noted below.

It is permissible to omit the facing point lock on trailing points in mechanically worked installations where it can be demonstrated that the risk of derailment is negligible. Additional requirements for installations where the movement, detection and locking of points are performed mechanically are set out in GK/RT0039.

It is permissible to omit the facing point lock on points in sidings.

7.2 Facing Point Lock on Train Operated Points
Train operated points with a maximum facing speed greater than 15mph shall have a facing point lock.

Train operated points with facing point locks shall lock the switches on reaching the normal position.
Train operated points with facing point lock shall unlock the switches on the approach of any trailing movement from the reverse direction to permit the passage of a train through the point without damage or derailment at speeds up to the maximum trailing speed for which they have been designed and approved.

7.3 Facing Point Lock Settings at Switches
If the gap between a closed switch rail and its stock rail is 3.5mm or greater, measured at the centre of the first slide chair or baseplate, the facing point lock shall not engage.

7.4 Facing Point Lock Settings at Switch Diamonds
If the gap between a closed switch rail and its wing rail is 3.5mm or greater, measured at the centre of the first slide chair or baseplate, the facing point lock shall not engage.

7.5 Facing Point Lock Settings at Swing Nose Crossings
If the gap between a closed swing nose crossing vee and its wing rail is 3.5mm or greater, measured at the crossing nose, the facing point lock shall not engage.

8 Detection

8.1 Detection of Worked Points - Power Operated Points
Power operated points shall have apparatus to detect that the appropriate movable track component of each point end (for example, a switch rail) is in its correct position relative to its associated fixed rail (for example, a stock rail).

Normal or reverse detection shall be proved and indicated only when the appropriate movable track components of each point end are fully closed or open with respect to their associated fixed rail. Detection settings are given in sections 8.5 to 8.7.

Where a facing point lock or similar device is provided, detection shall be obtained only when the point lock is fully engaged.

Normal or reverse correspondence shall be obtained by the interlocking only when all point ends forming a set of points are detected to be in the position required.

8.2 Detection of Worked Points - Mechanically Operated Points
Mechanically operated points with movements over the points in the facing direction shall be detected. The requirements for detection shall be the same as for power operated points set out in section 8.1.

It is permissible to omit detection on points in mechanically worked installations used exclusively in the trailing direction.

Mechanical detection is permitted only where there is mechanical operation of the points and mechanical operation of any facing direction signals.

Additional requirements for installations where the movement, detection and locking of points are performed mechanically are set out in GK/RT0039.

8.3 Detection of Train Operated Points
Train operated points shall be detected for facing movements in the normal position by lineside signals or by point indicators.

If the points are not detected normal or if, in the case of train operated points without a facing point lock, the closing force cannot be maintained, then the associated signal or point indicator shall not display a proceed aspect or indication.

If mechanically operated signals apply over train operated points in the facing direction, each clearance of the signal shall be for one movement only.
8.4 Separate Indication of Point Ends
It is permissible for correspondence of individual point ends or groups of point ends forming a set of points to be indicated separately to the signaller in order to facilitate hand signalling of train movements when there is a partial failure.

To reduce the potential for error, the number of separately indicated point ends or groups of point ends shall be minimised.

Correspondence shall not be separately indicated between:

- the two point ends of a switch diamond;
- swing nose crossings and their associated switch rails;
- supplementary detectors and their associated primary drive.

Where control of individual point ends is required, they shall be given separate point identities (that is, they shall act as separate points).

8.5 Detection Settings at Switches
Normal or reverse detection shall not be proved or indicated when the gap between a closed switch rail and its stock rail is 5mm or greater at the switch toe or 8mm or greater at the location of supplementary detectors.

Normal or reverse detection shall not be proved or indicated when the gap between an open switch rail and its stock rail is less than the minimum openings specified in section 9.5.

8.6 Detection Settings at Switch Diamonds
Normal or reverse detection shall not be proved or indicated when the gap between a closed switch rail and its wing rail is 5mm or greater at the switch toe.

Normal or reverse detection shall not be proved or indicated when the gap between an open switch rail and its wing rail is less than the minimum openings specified in section 9.6.

8.7 Detection Settings at Swing Nose Crossings
Normal or reverse detection shall not be proved or indicated when the gap between a closed swing nose crossing vee and its wing rail is 5mm or greater at the crossing nose or 8mm or greater at the location of supplementary detectors.

Normal or reverse detection shall not be proved or indicated when the gap between an open swing nose crossing vee and its wing rail is less than the minimum openings specified in section 9.7.

9 Flangeway Gaps and Track Gauge

9.1 General Requirements for Flangeway Gaps and Track Gauge
When the points are in either the normal or reverse position, the open point end shall provide an adequate gap for wheel flanges.

Flangeway gaps and the correct track gauge shall be maintained throughout the length of the point end. Where necessary, supplementary drives and supplementary detection shall be provided to achieve this.

Requirements for track gauge are set out in GC/RT5021.

9.2 Stretcher Bars on Switches and Switch Diamonds
Sufficient stretcher bars of the required length shall be provided to ensure that the design flangeway is always achieved on the open side when a switch rail is correctly fitting to its adjacent stock rail or wing rail on the closed side.
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On passenger lines, not less than two stretcher bars, excluding the lock stretcher bar, shall be used to connect together the switch rails of a set of switches or switch diamonds.

Stretcher bars shall be insulated where appropriate to meet signalling requirements.

9.3 Soleplates at Switches and Switch Diamonds
A soleplate or equivalent shall be provided at the toes of switches and switch diamonds to:

- rigidly connect opposite stock rails or wing rails to maintain track gauge;
- rigidly connect the point operating mechanism to the stock rail.

Soleplates shall be insulated where appropriate to meet signalling requirements.

9.4 Soleplates at Swing Nose Crossings
A soleplate or equivalent shall be provided at swing nose crossings to rigidly connect the point operating mechanism to the wing rail where this is not done directly (that is, where the point operating mechanism is not integral with the wing rail).

Soleplates shall be insulated where appropriate to meet signalling requirements.

9.5 Flangeway Gaps at Switches
A minimum flangeway gap of 100mm shall be maintained at the toes of switches. A flangeway gap of not less than 50mm shall be maintained elsewhere through the switch.

9.6 Flangeway Gaps at Switch Diamonds
Flangeway gaps at switch diamonds shall be the same as those for switches specified in section 9.5, other than as noted below.

Where switch diamonds are operated by a rail clamp point lock mechanism (clamp lock), it is permitted to reduce the opening at the toe to a minimum of 85mm.

9.7 Flangeway Gaps at Swing Nose Crossings
A minimum flangeway gap of 85mm shall be maintained at the nose of swing nose crossings. A flangeway gap of not less than 50mm shall be maintained elsewhere through the crossing.

10 Facilities for Manual Operation of Points

10.1 Provision of Facilities for Manual Operation of Points
Facilities shall be provided to permit manual operation of power operated points to either position, independently of the power source and commands from the interlocking.

10.2 Design Requirements for Manual Operation of Points
Enabling of manual operation shall disconnect the point end from the power source. Further power operations by the interlocking shall be prevented until the points operator has operated a reset or reconnection device which has the effect of preventing manual operation.

For electro-pneumatic points, it is permissible to disconnect the interlocking commands and locally operate point ends using the pressurised air supply.

Selection of manual operation of points shall not disconnect the means of communication of detection to the interlocking.

Subject to interlocking constraints, it shall be possible to bring the interlocking into correspondence after power worked points have been manually operated.
10.3 Positioning of Control Equipment for Manual Operation

Where reasonably practicable, control equipment for manual operation of points shall be positioned so that:

- access to the equipment can be gained without exposure to the hazards of passing trains or exposed electrical conductors;
- it can be operated from a position of safety.

Within these constraints, the control equipment shall be sited as close to the points as is practicable.

10.4 Security of Control Equipment for Manual Operation

Control equipment for manual operation shall be secured so that access is available only to authorised persons.

10.5 Procedure for Manual Operation of Swing Nose Crossings

The Infrastructure Controller shall have a procedure for the manual operation of swing nose crossings. The procedure shall ensure that both the swing nose crossing and its associated switches are in the correct position before being secured or returned to power operation.

10.6 Procedure for Manual Operation of Point Ends with Independent Point Operating Mechanisms

The Infrastructure Controller shall have a procedure for the manual operation of points where several independent point operating mechanisms are used to provide the movement of a point end. The procedure shall define the sequence of operations required to ensure that the point end is in its correct position throughout its length before being secured or returned to power operation.

11 Facilities for Securing Points

11.1 Provision of Facilities for Securing Points

All points shall include a means of manually securing both open and closed point ends relative to their respective stock rails or equivalent. The means of securing the points shall be independent of the point operating mechanism. It shall allow for:

- points temporarily secured (for example, to permit single line working; when the point operating mechanism has failed; for unsignalled movements);
- points secured out of use for extended periods (for example, where the wear and damage on the switch or stock rail exceeds permissible limits - see section 16.2; when not connected to a controlling signal box or ground frame operation - see section 14).

A device (for example, a padlock) shall be provided to prevent unauthorised removal of the means of securing the points.

Where point clips are used to secure points, the points shall be designed to permit the clips to be fitted as close to the toe of the points as possible.

Where points are provided with a facing point lock and the points are to be secured out of use for extended periods, the locking mechanism shall be secured in the locked position.
11.2 Securing Switches
Switch securing blocks with padlocks shall be provided to secure switches on concrete bearers.

It is permissible to provide switch securing blocks with padlocks to secure switches on timber bearers. Where these are not provided, scotches and point clips with padlocks shall be provided as an alternative and the following additional measures shall be taken when the switches are to be secured out of use for extended periods:

- closed switch rail to be further secured by a fish plate screwed to the bearer by two screws or fang bolts;
- open switch rail scotch to be screwed to the bearer or otherwise secured.

11.3 Securing Switch Diamonds
Switch securing blocks with padlocks, or scotches and point clips with padlocks, shall be provided to secure switch diamonds.

Both half sets of the switch diamond shall be secured.

11.4 Securing Swing Nose Crossings
Point clips or equivalent devices with padlocks shall be provided to secure swing nose crossings.

The associated switches shall be secured together with the swing nose crossing.

12 Point Heating Systems

12.1 Location and Fixing of Point Heaters
The location and method of fixing point heaters and their associated supply and control systems to rails, bearers and other point components shall:

- not compromise the operation of the points to which they are fitted.
- not conflict with the means of securing points (see section 11).

12.2 Management of Heat Hazards from Point Heating Systems
The heat generated by point heating systems shall be controlled so as to avoid interference with or degradation of points and their control components, lubricants and other systems within the vicinity.

12.3 Management of Electromagnetic Compatibility (EMC) Hazards from Electric Point Heating Systems
All electric point heating systems shall be electromagnetically compatible with point detection, train detection and any other train control equipment in use in the vicinity.

12.4 Mechanical Integrity of Point Heating Systems
The mechanical integrity of all point heating systems shall be sufficient so as not to cause danger to traffic, personnel, point operation, train detection or other systems by means of mechanical displacement or failure of equipment and components.

13 General Equipment Design Requirements

13.1 General Equipment Performance Requirements
Point operation and detection mechanisms shall be designed to operate reliably without frequent adjustment under all credible operating conditions, taking into account vibration, temperature, precipitation and environmental pollution.

Where practicable, all failure modes of worked points which present an unacceptable risk to train movements shall result in a loss of correspondence.
13.2 **Integrity of Points and Associated Operating Equipment**

The integrity of points and their associated operating equipment shall be appropriate to the risks associated with train movements traversing or protected by the points. Consideration shall be given to:

- the transmission of commands from the interlocking (see section 5);
- the movement of points (see section 6);
- the locking of points (see section 7);
- the detection of the switch rails relative to the stock rails (see section 8);
- the transmission of detection information to the interlocking (see section 8);
- the retention of the correct flangeway gaps and track gauge (see section 9);

Particular consideration shall be given to:

- ensuring the effectiveness of facing point locks on resiliently mounted S&C;
- ensuring that inadvertent movement of points by the release of stored energy (for example, in hydraulically powered point operating mechanisms) is not possible.

Monitoring and diagnostic systems shall be provided where necessary to achieve the required integrity.

Points and their associated operating equipment shall be designed so that:

- a trailing movement passing through a point end which is in other than the correct position does not result in a derailment;
- a trailing movement passing through a worked point end which is in other than the correct position results in a loss of detection;
- the movement of a point end may be stopped, reversed or obstructed at any time during its travel without damage.

13.3 **Particular Requirements for Train Operated Points**

Failure to move to the reverse position on train operated points without facing point lock under a trailing move shall not result in a derailment, but shall result in loss of detection if the points subsequently fail to return to the normal position.

Failure to unlock for a trailing movement on train operated points with facing point lock shall not result in a derailment, but shall result in loss of detection.

Some types of components, for example slide baseplates fitted with plastic inserts, are not suitable for use in train operated points. The Infrastructure Controller shall identify such components and introduce measures to ensure that they are not used in train operated points.

13.4 **Point Operating Times**

The Infrastructure Controller shall specify maximum point operating times taking into account the requirements for:

- swinging of overlaps;
- the interlocking;
- sequential operation of points.

Generally, operating times for individual point ends shall not exceed 5 seconds.

13.5 **Accommodation of Vertical Lift to Switch Rails**

Stretcher bars and connections to point operating mechanisms shall be designed to accommodate any vertical lift to switch rails required to facilitate their movement, for example though the use of roller baseplates.
13.6 Matching of Switch and Stock Rails and Equivalents

Before they are installed in the track, the following shall be checked after manufacture to demonstrate that they form matching sets in the closed position:

- stock rails and their associated switch rails;
- switch diamond wing rails and their associated switch rails;
- swing nose crossing wing rails and their associated crossing vee.

Related requirements for changing rails are set out in section 17.

13.7 Requirement for Standard Drawings

Standard drawings shall be prepared for all types of switches, switch diamonds and swing nose crossings showing critical dimensions with construction and maintenance tolerances.

The dimensions shown on the standard drawings shall include any dimensions necessary to define the longitudinal and lateral positions of moving components relative to adjacent fixed components (for example, the positions of the switch rail toes of a switch diamond in relation to adjacent wing rails). The dimensions and tolerances shown on the standard drawings shall also include those specified in sections 9.5, 9.6, 9.7 and 16.3.

13.8 Acceptance of Equipment for use in Railtrack Controlled Infrastructure

Requirements for the acceptance of systems, equipment and materials for use in Railtrack controlled infrastructure are set out in GI/RT7002.

14 Installation and Removal of Points

14.1 Connection of Points to a Controlling Signal Box or Ground Frame

When points are installed, they shall be connected to the controlling signal box or ground frame as soon as reasonably practicable after installation.

Redundant points shall be removed as soon as reasonably practicable after they have been disconnected from the controlling signal box or ground frame.

The interval between installation and connection or disconnection and removal shall not usually exceed six months. Where the interval between installation and connection or disconnection and removal exceeds six months, the reasons for the extended interval shall be fully documented, together with details of the measures taken to reduce any risks arising.

14.2 Securing Points Out Of Use when Not Connected to a Controlling Signal Box or Ground Frame

Switches, switch diamonds and swing nose crossings installed in the running line shall be secured out of use in accordance with section 11 when not controlled by a signal box or ground frame.

Switches and switch diamonds shall be secured out of use in accordance with section 11 when their associated crossings have been removed (plain lined).

Swing nose crossings shall be secured out of use in accordance with section 11 when their associated switches have been removed.

It is permissible to change the position in which points are secured when the direction of running is changed during stageworks for track remodelling.

14.3 Use of Points when Not Connected to a Controlling Signal Box or Ground Frame

Under usual circumstances, points which have been secured out of use because they are not connected to the signal box or ground frame operation shall remain at all times in the position in which they are secured.
Requirements for the Design, Operation and Maintenance of Points

If, in exceptional circumstances, it is necessary for the points to be used in the other position, a possession of the line concerned shall be taken. Once the points have been used, they shall be secured in their original position before the possession is given up.

15 Inspection of Points

15.1 Requirement for Inspection of Points
All points shall be regularly inspected using the procedures required by section 15.2 at frequencies determined in accordance with sections 15.4, 15.5 and 15.6.

15.2 Procedures for the Inspection of Points
The Infrastructure Controller shall have procedures for the inspection of points. The procedures shall contain the following elements:

- detection of sidewear, lipping and damage to switch and stock rails or their equivalents;
- checking the relationship between switch and stock rails in the open and closed positions;
- checking the track gauge through the points;
- checking the switch rail bears evenly on the slide chairs or baseplates;
- checking the slide chairs or baseplates are clean and are adequately lubricated where this is required by their design;
- checking that all bolts are fitted and correctly tightened;
- where practicable, observing the passage of a train over the points to assess their performance and behaviour under traffic, for example packing of ballast and tightness of components;
- testing the facing point lock to ensure the settings required by sections 7.3, 7.4 and 7.5 are correct;
- testing the detection to ensure the settings required by sections 8.5, 8.6 and 8.7 are correct;
- checking for signs of mechanical wear in the point operating mechanism, facing point lock and detection equipment;
- checking the integrity of the electrical parts of the point operating mechanism, facing point lock and detection equipment.

15.3 Procedures for Detection of Sidewear, Lipping and Damage to Switch and Stock Rails
The procedures for detection of sidewear, lipping and damage to switch and stock rails required by section 15.2 shall include:

- procedures for regular visual inspection (see also section 15.5);
- detailed inspection procedures to be used when visual inspection indicates the limits defined in accordance with section 16.2 are being approached.

The detailed inspection procedures shall require the measurement of wear and damage using purpose designed gauges or other suitable measuring instruments. The measurements shall be made with the switches in both the normal and reverse positions. The detailed inspections shall be carried out by people who are trained and certificated as competent in the procedures.

15.4 Determination of Frequency of Point Inspections
The Infrastructure Controller shall determine minimum frequencies of point inspections, taking the following factors into account:

Generic factors
- track category, as defined in GC/RT5023;
- type of points;
- type of point operating mechanism;
- identified failure modes;
Requirements for the Design, Operation and Maintenance of Points

Local factors
- predicted wear, damage and deterioration arising from the usual traffic flow;
- horizontal alignment;
- contamination from freight spillage;
- likelihood of vandalism.

Frequencies of inspection shall be reviewed when any of these factors change.

Consideration shall be given to the need for more frequent inspection of ground frame operated facing points where these are not detected in a protecting signal.

15.5 Frequency of Visual Inspection for Sidewear, Lipping and Damage to Switch and Stock Rails
The frequency of visual inspection for sidewear, lipping and damage to switch and stock rails shall be sufficient to ensure that the predicted wear will not cause the limits defined in accordance with section 16.2 to be exceeded before the next inspection. The intervals between visual inspection shall not exceed three months on facing points and trailing points used more than once a week in the facing direction.

15.6 Frequency of Facing Point Lock and Detection Tests
The frequency of facing point lock and detection tests required by section 15.2 shall be determined as set out in section 15.4. The intervals between the facing point lock tests shall not exceed three months.

15.7 Follow Up to Point Inspections
Reports of point inspections shall be reviewed to determine necessary actions. Arrangements shall be made to undertake any necessary actions within a timescale commensurate with expected deterioration of the conditions found and the likelihood and consequences of derailment.

Where visual inspection for sidewear, lipping and damage to switch and stock rails indicates limits defined in accordance with section 16.2 are being approached, a detailed inspection, as set out in section 15.3, shall be undertaken.

15.8 Records of Point Inspections
Records of all point inspections shall be kept for a minimum of 2 years. The records shall include:
- the date and method of inspection;
- the person undertaking the inspection;
- the faults and defects found;
- any subsequent actions taken;
- any decisions to take no action about reported faults or defects.

15.9 Additional Inspection of Switches Manufactured from Austenitic Manganese Steel (AMS) and Heat Treated Steel
All switches manufactured from austenitic manganese steel (AMS) and heat treated steel shall be additionally subject to the detailed inspection for sidewear, lipping and damage to switch and stock rails set out in section 15.3 at the following intervals:

<table>
<thead>
<tr>
<th>Time after installation or reprofiling</th>
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<tbody>
<tr>
<td>&lt; 1 month</td>
<td>1 week</td>
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<tr>
<td>1 - 6 months</td>
<td>1 month</td>
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<tr>
<td>6 - 18 months</td>
<td>3 months</td>
</tr>
<tr>
<td>&gt; 18 months</td>
<td>6 months</td>
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</table>
Requirements for the Design, Operation and Maintenance of Points

15.10 Inspection of Points Secured Out of Use
All points in the running line which have been secured out of use shall be inspected at intervals not exceeding two months to check the integrity of the securing arrangements and to check for changes to any wear or damage to switch and stock rails.

A record shall be made of each inspection. The records shall be retained until the points have been brought into use or removed from the track.

16 Maintenance of Points

16.1 General Maintenance Requirements
Points shall be maintained, paying particular attention to the items listed in section 15.2.

The space between the movable components of point ends and their associated fixed rails (for example, switch and stock rails) shall be kept clear of obstructions.

16.2 Limits on Wear and Damage to Switches, Switch Diamonds and Swing Nose Crossings
The Infrastructure Controller shall define limits of wear and damage to switches, switch diamonds and swing nose crossings installed in the running lines. The limits shall identify when:

- grinding, weld repair or other remedial action is required within stated timescales;
- points shall be secured out of use in accordance with section 11 because of an immediate risk of derailment.

The limits defined shall, in particular, address the risk of derailment arising from the following circumstances:

- where the stock rail and switch rail are both sideworn, particularly where the angle of sidewear on the switch rail is flatter than that on the stock rail;
- where a sideworn stock rail is associated with a little used switch rail;
- where head wear on the stock rail reduces the difference in height between the stock rail and the switch rail;
- where there is damage to the blade of the switch rail, particularly within 2m of the switch toe;
- where a switch rail develops a sharp gauge corner profile or edge, particularly when associated with austenitic manganese steel (AMS) and heat treated steel (see section 15.9).

16.3 Maintenance of Relative Longitudinal Positions of Point Ends
Switch toes, other than those in single or double slips, shall be maintained such that their maximum stagger across gauge does not exceed 12mm.

The relative position of slip switch toes shall be maintained to the dimensions and tolerances shown on the appropriate standard drawings (see section 13.7).

Switch diamond toes shall be maintained such that their maximum stagger does not exceed 12mm, measured relative to a line drawn through the wing rail knuckles.

The longitudinal position of switch rails in relation to their associated switch or wing rails shall be maintained to the dimensions and tolerances shown on the appropriate standard drawing (see section 13.7).

The longitudinal position of the nose of swing nose crossings in relation to adjacent wing rails shall be maintained to the dimensions and tolerances shown on the appropriate standard drawing (see section 13.7).
Requirements for the Design, Operation and Maintenance of Points

The Infrastructure Controller shall have a procedure setting out minimum actions to correct the relative longitudinal position of point ends where these are found to be outside the required tolerances.

16.4 Monitoring of Faults in Points
The faults found by the inspection procedures required by section 15.2 and by other means shall be monitored to determine the effectiveness of maintenance procedures.

When trends indicating an increase in a particular type of fault are detected, or where the same fault is repeated at the same location, the points shall be inspected to determine the cause. A plan of action to deal with the faults shall then be prepared and executed within a timescale commensurate with the expected deterioration of the conditions found and the likelihood of derailment.

Extreme faults, requiring all traffic to be stopped immediately, shall be investigated to establish the circumstances surrounding the occurrence of the fault and action shall be taken to prevent a recurrence.

16.5 Other Inspection and Maintenance Requirements
General requirements for track inspection and maintenance are set out in GC/RT5021.

The actions to be taken on finding a broken, cracked or defective rail are set out in GC/RT5022.

17 Changing Rails

17.1 Switches
When it is necessary to change a switch rail or stock rail, both the switch rail and stock rail shall be changed at the same time as a matched pair to ensure a correct fit when the switch rail is in the closed position.

It is however permissible to change only the switch or stock rail where this has been damaged, provided there is no measurable wear or deformation on the matching rail.

Not all designs of switch rails are compatible. For example, a straight planed straightcut half set of switches (that is a stock rail and its associated switch rail) is not compatible with a curved planed chamfered half set. When a half set of switches are replaced, the new half set shall be compatible with the remaining half set.

17.2 Switch Diamonds
When it is necessary to change a switch diamond switch rail or wing rail, the complete half set (that is two switch rails and their associated wing rail) shall be changed at the same time as a matched set to ensure a correct fit when the switch rails are in the closed position.

It is however permissible to change only the switch or wing rail where this has been damaged, provided there is no measurable wear or deformation on the matching rail.

17.3 Swing Nose Crossings
When it is necessary to change a swing nose crossing vee or wing rail, the crossing vee and both wing rails shall be changed at the same time as a matched set to ensure a correct fit when the crossing vee is in the closed position.

It is however permissible to change only the crossing vee or wing rail where this has been damaged, provided there is no measurable wear or deformation on the matching rail.
18 Requirements for Unworked Points

18.1 Requirements Applicable to Unworked Points

Unworked points shall comply with the requirements of the following sections of this standard:

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18.2 Detection of Unworked Points

Consideration shall be given to providing detection on hand points and spring points where this will improve the safety of operation at the entrance to yards or in shunt necks. Where hand points and spring points are detected, the requirements of section 8 shall apply.

18.3 Facing Point Lock on Hand Points

Consideration shall be given to fitting a hand operated facing point lock to hand points in sidings adjacent to running lines.

18.4 Inspection and Maintenance of Unworked Points

In addition to the requirements of section 15.1, the operation of unworked points shall be checked to confirm that the closing spring force is sufficient to prevent the switches from moving under trains travelling in the facing direction.

18.5 Changing Rails in Unworked Points

When it is necessary to change a switch rail or stock rail, the replacement rail shall be compatible with the remaining switch or stock rail. The replacement rail shall provide a correct fit when the switch rail is in the closed position.

When a half set of switches (that is a stock rail and its associated switch rail) are replaced, the replacement half set shall be compatible with the remaining half set (see section 17.1).
19 Requirements for Derailers and Scotch Blocks

19.1 Requirements Applicable to Derailers and Scotch Blocks
Derailers and scotch blocks shall comply with the requirements of the following sections of this document:

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<td>19</td>
<td>Requirements for derailers and scotch blocks</td>
</tr>
</tbody>
</table>

19.2 Inspection and Maintenance of Derailers and Scotch Blocks
The Infrastructure Controller shall have a procedure for the inspection of derailers and scotch blocks. The Infrastructure Controller shall determine frequencies of inspection taking into account the usage of the derailers and scotch blocks.

Inspection reports shall be reviewed to determine necessary actions. Arrangements shall be made to undertake any necessary actions within a timescale commensurate with expected deterioration of the conditions found and the likelihood and consequences of a failure of the derailers and scotch blocks.
Requirements for the Design, Operation and Maintenance of Points

References

Railway Group Standards
- GA/RT6001: Railway Group Standards Change Procedures
- GA/RT6004: Temporary Non-Compliance with Railway Group Standards
- GA/RT6006: Derogations from Railway Group Standards
- GC/RT5011: Switches and Crossings
- GC/RT5021: Track System Requirements
- GC/RT5022: Rails and Rail Joints
- GC/RT5023: Categorisation of Track
- GC/RC5603: Standard Definitions of Civil Engineering Terms
- GI/RT7002: Acceptance of Systems, Equipment and Materials for use in Railtrack Controlled Infrastructure
- GK/RT0002: Glossary of Signalling Terms
- GK/RT0039: Semaphore and Mechanical Signalling
- GK/RT0060: Interlocking Principles
- GK/RT0061: Shunters Releases, Ground Frames, Switch Panels and Gate Boxes
- GK/RT0064: Provision of Overlaps, Flank Protection and Trapping