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Guidance on Mechanical Trainstop System Interface Requirements

Issue One: September 2012

Rail Industry Guidance Note for GE/RT8018



Documents

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Guidance on Mechanical Trainstop System Interface Requirements

Issue record

Issue	Date	Comments
One	September 2012	This guidance note has been issued to support GE/RT8018 issue two which is a post-filtering issue and now contains interface measures only.

Superseded documents

This Rail Industry Guidance Note does not supersede any other Railway Group documents.

Supply

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Guidance on Mechanical Trainstop System Interface Requirements

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Part 1 Introduction

1.1 Purpose of this document

- 1.1.1 This document gives guidance on interpreting the requirements of Railway Group Standard GE/RT8018 issue two Mechanical Trainstop System Interface Requirements. It does not constitute a recommended method of meeting any set of mandatory requirements.
- 1.1.2 All requirements in GE/RT8018 issue two are reproduced in the sections that follow. Guidance is provided as a series of sequentially numbered clauses prefixed 'GN' immediately below the boxed text to which it relates. Where there is no guidance given, this is stated.
- 1.1.3 Specific responsibilities and compliance requirements are laid down in the Railway Group Standard itself.

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1.3 Approval and authorisation of this document

- 1.3.1 The content of this document was approved by Control Command and Signalling (CCS) Standards Committee on 17 May 2012.
- 1.3.2 This document was authorised by RSSB on 29 June 2012.

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Part 2 Guidance on Track Subsystem Requirements

- GN1 Mechanical trainstop systems were developed to provide automatic train protection functionality on metro-style railways. On such lines, the combination of train speeds, density of traffic and close spacing of trains results in an increased level of operational risk compared to mainline railway operation. Mechanical trainstops have been widely applied on lines used by London Underground Ltd (LUL), including lines of the national rail network over which London Underground trains operate. Mechanical trainstops are also used instead of the Automatic Warning System (AWS) and the Train Protection and Warning System (TPWS) on a limited number of other lines of the national network primarily carrying a metro-style passenger service, including Finsbury Park to Moorgate and parts of the Merseyrail system.
- GN2 The mechanical trainstop system is made up of two subsystems:
- a) An infrastructure subsystem, comprising:
 - i) Track-mounted trainstop equipment.And
 - ii) Tripcock tester equipment and associated indications.
 - b) A vehicle subsystem (tripcock equipment).
- GN3 The mechanical trainstop system operates on the principle of a mechanical interface between track-mounted trainstops and vehicle-mounted tripcocks.
- GN4 Each fitted train has tripcock equipment mounted at the front of the leading vehicle on the right-hand side. The tripcock is connected to the train braking system, so that when it is moved to the activated position, an emergency brake application is automatically initiated.
- GN5 Each trainstop incorporates a moveable trainstop arm. The trainstop arm is controlled by the signalling system to be in one of two positions, raised (effective) or lowered (ineffective).
- GN6 When the trainstop arm is in its raised (effective) position, the tripcock on a passing train strikes the trainstop arm and the tripcock is moved to its activated position. The tripcock remains in the activated position until it is reset from within the driving cab.
- GN7 When the trainstop arm is in its lowered (ineffective) position, the tripcock does not come into contact with the trainstop arm and therefore there is no brake application.
- GN8 The trainstop arm moves to its lowered position either:
- a) When the associated signal shows a proceed aspect.
- Or
- b) In the case of a speed control application, when the speed of the approaching train is determined to be sufficiently slow.
- GN9 The length of the overlap beyond a trainstop fitted signal should be designed to provide a safe stopping distance beyond the trainstop, so that unauthorised movements past the signal are brought to a stand within the overlap when the train is tripped.
- GN10 In the case of trainstops on the approach to buffer stops, the length of line beyond the trainstop should be designed to ensure that a train exceeding a safe speed profile is brought to a stand before the buffer stops.

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- GN11 Tripcock testers are provided to indicate to the driver that the tripcock is correctly aligned. Trains are not permitted to enter the trainstop protected area if the tripcock is not correctly aligned unless an agreed operational procedure is implemented.

2.1 Criteria for provision of trainstop equipment

- 2.1.1 On lines where a mechanical trainstop system is the selected method of train protection, and which at 30 January 2000 were used by trains operated by London Underground Ltd, trainstops shall be provided:
- a) At all stop signals.
 - b) At all signals which control access to a line fitted with trainstops, unless another suitable form of overrun protection is provided.
 - c) For speed control on the approach to all terminal and bay platforms.
- 2.1.2 On other lines where a mechanical trainstop system is the selected method of train protection, trainstops shall be provided:
- a) At all main stop signals, except those which protect plain line only.
 - b) At all stop signals which control access to a line fitted with trainstops, unless another suitable form of overrun protection is provided.
 - c) For speed control on the approach to all terminal and bay platforms.
 - d) For speed control on the approach to a reduction in permissible speed where:
 - i) The permissible speed on the approach is 60 mph or more.
- And
- ii) The reduction in speed is one third or more of the permissible speed on the approach.

- GN12 Rationale: Train protection systems are provided to reduce the level of operational risk associated with:

- a) A train passing a stop aspect.
- b) A train approaching a buffer stop at an excessive speed.
- c) A train approaching a reduction in permissible speed at excessive speed.

- GN13 These fitment rules are consistent with the Railway Safety Regulations 1999, which include a specific exemption applying to lines previously fitted with trainstops that were used by LUL trains before 30 January 2000.

- GN14 The Network Rail lines covered by this exemption include:

- a) Queens Park to Harrow and Wealdstone.

And

- b) Gunnersbury to Richmond.

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- GN15 This exemption also applies to lines used by Tyne & Wear Passenger Transport Executive, Strathclyde Passenger Transport Executive, and Serco Metrolink Limited; however, none of these systems use mechanical trainstops on lines shared with the mainline network.
- GN16 On lines where this exemption applies, provision of a trainstop at every stop signal is compatible with established LUL practice.
- GN17 On lines where the exemption does not apply, the mechanical trainstop system is required to meet the train protection requirements of the Railway Safety Regulations 1999, which are based on the functionality provided by TPWS. In this case it is not mandatory to fit trainstops at stop signals protecting plain line sections; however, where AWS is not provided, existing practice is to provide trainstops at all stop signals.
- GN18 In respect of 2.1.1b) and 2.1.2b), the overrun protection system should be designed to prevent a trainstop fitted train from entering a line fitted with trainstops when no movement authority is available. Where trap points exist, these will provide an acceptable alternative.
- GN19 In respect of 2.1.2d), mechanical trainstop systems are not generally selected as the train protection system on lines where trains operate at 60 mph or more.

2.1.3	On lines where a mechanical trainstop system is the selected method of train protection, trainstops shall also be provided at other locations where an assessment of the risks demonstrates it to be necessary.
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- GN20 Rationale: Trainstops have the capability of stopping a train automatically and therefore can be used to mitigate collision risk when a train fails to stop at a signal or other limit of movement authority.
- GN21 If, on a particular route, it is decided not to fit trainstops at all plain line signals, a risk assessment should be used to identify additional locations where trainstops should be provided to control specific risks.
- GN22 Specific situations where trainstops should be considered for use include:
- a) Stop signals which protect plain line but have a level crossing within the route beyond them.
 - b) Stop signals protecting plain line where the severity of a rear end collision could be particularly serious, for example:
 - i) Where mixed traffic types operate (for example, metro / light rail and freight trains).

Or

 - ii) In tunnels.

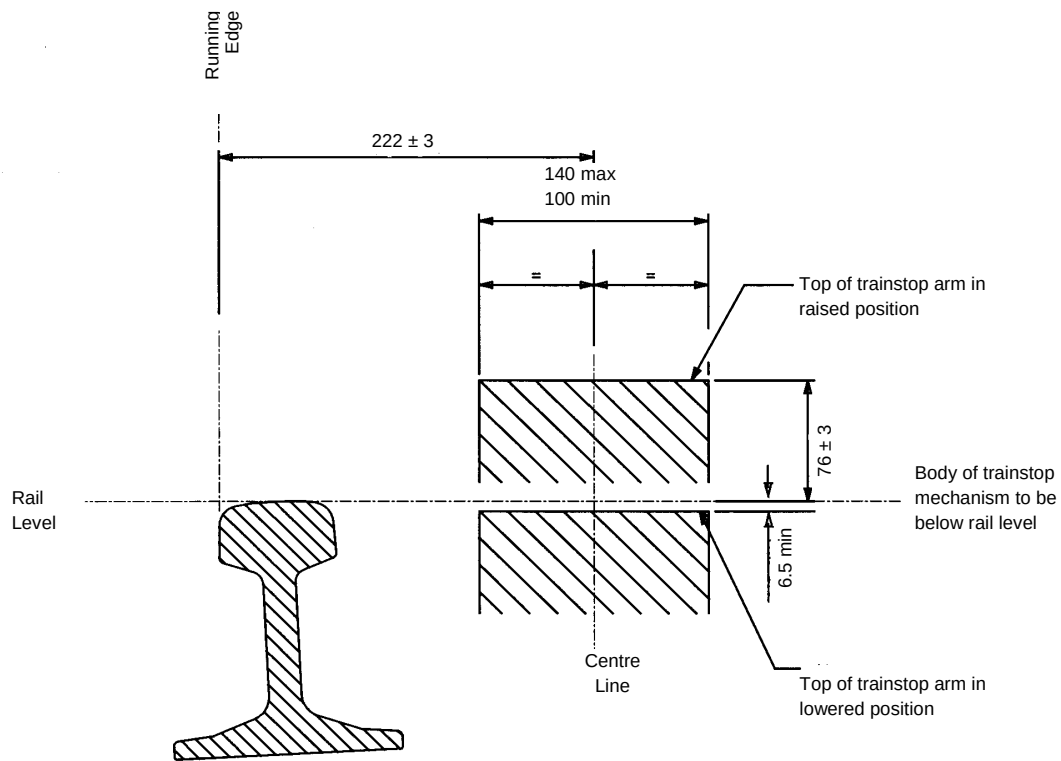
Or

 - iii) Where trains beyond the signal are most likely to be stationary (for example, at stations).
 - c) A fixed trainstop immediately before the stopping point at terminal and bay platforms.

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2.2 Trainstop interface parameters

- 2.2.1 Trainstops shall be fitted to the outside of the right-hand running rail as viewed in the direction to which they apply.
- 2.2.2 Trainstops shall comply with the parameters shown in Figure 1.



NOTES:

1. View is in the direction of travel of the train.
2. All dimensions are in millimetres.

Figure 1 Mechanical trainstop parameters

- GN23 Rationale: Trainstops are fitted so that when the trainstop arm is in the raised position it operates the tripcock equipment fitted to the right-hand side of rail vehicles.
- GN24 Rationale: The height of the top of the trainstop arm in the raised and lowered positions is specified to provide technical compatibility with the tripcock in terms of system operation.

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- GN25 Rationale: The physical parameters and tolerances specified for trainstops are compatible with:
- a) The position of tripcocks on vehicles.
- And
- b) Variations in tripcock position due to vehicle dynamics.
- GN26 The risks to be controlled include:
- a) A tripcock not being operated when the trainstop is in the raised position.
 - b) A tripcock being operated when the trainstop is not in the raised position.
 - c) The trainstop fouling the vehicle envelope.
- GN27 Required clearances between trains and infrastructure are set out in GC/RT5212.
- GN28 Because trainstops installed on the track are required to physically interact with the tripcocks installed on trains, there has to be a controlled infringement of the normal rules for required clearances between trains and infrastructure.
- GN29 Compliance with GC/RT5212 should ensure that:
- a) No part of the train, or equipment installed on trains other than tripcocks, should come into contact with trainstops.
- And
- b) No equipment on the infrastructure other than a raised trainstop arm or a tripcock tester should come into contact with tripcocks on trains.

2.2.3 Trainstops associated with stop signals shall be positioned along the track as near as practicable to the longitudinal position of the signal, but not on the approach to the signal.

- GN30 Rationale: When the signal is at danger, a brake application should be initiated as soon as practicable after an unauthorised movement past the signal has occurred.
- GN31 Rationale: The trainstop should not initiate a brake application if the train is brought to a stand by the driver before passing the signal.
- GN32 The risk being controlled includes a driver not associating a train being tripped with passing a signal displaying a stop aspect.
- GN33 It is good practice to position the trainstop within 5 m beyond the signal.

2.2.4 Trainstops provided for speed control applications shall be positioned and controlled to ensure that a brake application is initiated by the trainstop as soon as practicable after an overspeed condition has been detected.