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Permissive Working Risk Assessment and Risk Controls

Synopsis

This document sets out the Control, Command and Signalling (CCS) system requirements for authorising a train movement into an occupied section of line, and the factors to be considered in undertaking a permissive working risk assessment.

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Issue Record

Issue	Date	Comments
One	01/12/2018	Original document. The CCS requirements and guidance for permissive working have been reviewed and updated. The existing content in GKRT0044 issue three and GKGN0644 issue two is withdrawn

Superseded Documents

The following Railway Group documents are superseded, either in whole or in part as indicated:

Superseded documents	Sections superseded	Date when sections are superseded
GKRT0044 issue three Permissive Working	2.1.2, 2.2a) & b), 2.3.1b), 3.2.1 (except 3.2.1d)i)), 3.2.2, 4.2.1 (except 4.2.1b)i)), Appendix A	01/12/2018
GKGN0644 issue two Guidance on Permissive Working	All guidance as associated with sections above	01/12/2018

Supply

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Part 1 Purpose and Introduction

1.1 Purpose

1.1.1 The Railways and Other Guided Transport Systems (Safety) Regulations (ROGS) (as amended), place obligations on Transport Operators to undertake risk assessments and reduce risk to an acceptable level.

1.1.2 Regulation (EC) 352/2009 on a Common Safety Method for Risk Evaluation and Assessment (CSM RA) places obligations on Proposers to identify hazards and to apply risk acceptance principles to confirm that risk is controlled.

1.1.3 This document sets out requirements for permissive working risk assessment and requirements for CCS system controls that can reduce the risk of a train-on-train collision during permissive working. It also provides guidance on applying the requirements.

1.1.4 The content in this document is based on current lineside signalling system practice on the Great Britain (GB) mainline railway and the European Rail Traffic Management System / European Train Control System (ERTMS/ETCS) reference design topic 'H: Permissive moves', version 3.0, developed to inform the implementation of ERTMS/ETCS.

1.1.5 The requirements are available to Transport Operators and Proposers in controlling the hazard of permissive working on the GB mainline railway.

1.2 Introduction to permissive working

Permissive movement authorities (MAs)

1.2.1 One of the primary functions of a railway signalling system is to prevent train-on-train collisions. In most cases, this is done by providing MAs to trains only when the section of line applicable to that MA is clear of other trains or rail vehicles for as long as the MA persists. These MAs are defined as 'non-permissive' MAs.

1.2.2 At some locations the operational context means that it is not practicable to operate all trains using non-permissive MAs. Permissive working is a method of signalling a train movement into a section of line that is occupied by another train(s) or rail vehicle(s). These signalled MAs are defined as 'permissive MAs'.

1.2.3 Permissive MAs can be provided using the lineside signalling system or a cab signalling system such as the ERTMS/ETCS.

1.2.4 Use of permissive MAs can increase the number of train operations that the track layout can accommodate and enhance operational flexibility. Incorporating a signalling system facility to provide permissive MAs that anticipates future operational needs can provide economic benefits compared with retrospective provision that would require further system modifications.

1.2.5 There are two categories of train working that can use permissive MAs:

a) Permissive passenger (PP) working.
b) Permissive freight (PF) working.

1.2.6 PP working can realise:

a) Economic and train performance benefits that arise from the ability to couple two or more trains, or attach additional vehicles to a train.
b) Capacity benefits at stations where the number of trains being operated exceeds the platform capacity.
c) Passenger convenience and safety benefits that arise when two or more trains share the same station platform, for example passengers not having to use bridges, stairs or subways.

1.2.7 PF working can realise capacity and economic benefits that arise from the ability to authorise trains to follow one another into the same section of line, for example when awaiting acceptance into depots or yards, or when following along a goods line.

1.2.8 The signalling system requirements for permissive working set out in this document are relevant to meeting four key principles:

a) A permissive MA is provided to a train only when predetermined criteria for the section of line to which it applies are met. The criteria are different for passenger train and freight train permissive working.
b) A permissive MA is provided to a train only when its speed is assumed to be commensurate with the requirement for the train driver to stop the train clear of any obstruction.
c) The permissive MA is interpretable. Train drivers need to be able to understand that the train has a permissive MA and that the rules for permissive working apply.
d) When a train has started to use a permissive MA, the conditions for providing that permissive MA are maintained until the train has stopped at the end of its movement.

Shunting movement authorities (MAs)

1.2.9 A shunting MA is also permissive in nature and uses similar lineside signalling system displays; however, the operational rules applicable to shunting operations are different from those applicable to permissive working.

1.2.10 The lineside signalling system requirements for shunting MAs are set out in RIS-0703-CCS and RIS-0713-CCS.

Permissive working risk assessment

1.2.11 Permissive working is a hazard because it removes the signalling system control that is usually provided to maintain train separation. When a train is using a permissive MA, the signalling system does not indicate the limit of MA and the train driver is responsible for identifying the required train stopping point using alternative visual cues.

1.2.12 The permissive working risk assessment is used to confirm that the signalling system controls for providing permissive MAs are consistent with controlling train-on-train collision risk whenever the facility is used.

1.2.13 The permissive working risk assessment set out in *2.1* includes 19 factors that are known to influence train-on-train collision risk when permissive working is used. This

reflects the experience resulting from train-on-train collisions that have occurred during permissive working, for example Newton Abbot: March 1994.

1.2.14 The permissive working risk assessment described in this document does not cover other hazards and risks that affect safe integration when permissive working is used, for example:

a) Risk of slips, trips and falls.
b) Passenger : train interface risk.

Further requirements and guidance

1.2.15 Further requirements for providing permissive MAs using the lineside signalling system are set out in RIS-0703-CCS Part 2.

1.2.16 The requirements for providing a permissive MA using ERTMS/ETCS are set out in *2.4*.

1.2.17 The operating rules applicable to permissive working are set out in Rule Book modules S7, TS2, TS10 ERTMS and TW1.

1.2.18 Further guidance on how to meet the requirements of the CSM RA is given in GEGN8646.

1.2.19 Further guidance on safe integration of CCS systems and train operations, including the applicability of RSSB standards and the framework of risk assessments that inform a decision that risk is reduced to an acceptable level, is given in GEGN8651.

1.3 Application of this document

1.3.1 Compliance requirements and dates have not been specified because these are the subject of internal procedures or contract conditions.

1.3.2 If you plan to do something that does not comply with a requirement in this RIS, you can ask a Standards Committee to comment on your proposed alternative. If you want a Standards Committee to do this, please submit your deviation application form to RSSB. You can find further advice in the 'Guidance to applicants and members of Standards Committee on using alternative requirements', available from RSSB's website www.rssb.co.uk.

1.4 Health and safety responsibilities

1.4.1 Users of documents published by RSSB are reminded of the need to consider their own responsibilities to ensure health and safety at work and their own duties under health and safety legislation. RSSB does not warrant that compliance with all or any documents published by RSSB is sufficient in itself to ensure safe systems of work or operation or to satisfy such responsibilities or duties.

1.5 Structure of this document

1.5.1 This document sets out the signalling principle requirements and scope of risk assessment that are applied to the provision of facilities to provide permissive MAs on the GB mainline railway. The rationale explains why each requirement is needed and guidance explains how compliance can be achieved.

1.5.2 *Appendix A* sets out guidance on the factors that are relevant to the assessment of permissive working risk.

1.6 Approval and authorisation of this document

1.6.1 The content of this document was approved by the Control Command and Signalling Standards Committee on 30 August 2018.

1.6.2 This document was authorised by RSSB on 02 October 2018.

Part 2 Permissive Working Risk Assessment and Risk Controls

2.1 Assessment of permissive working risk

2.1.1 The permissive working risk assessment shall consider, as a minimum, the factors in Table *1*, Table *2* and Table *3*.

Factor description	Factor reference
Types of permissive train movement	Appendix *A.1*
Frequency of permissive train movements	Appendix *A.2*
Availability of alternatives to permissive train movements	Appendix *A.3*

Table 1: Factors associated with the provision and use of permissive working facilities

Factor description	Factor reference
Interpretability of the permissive MA	Appendix *A.4*
The train driving task when using a permissive MA	Appendix *A.5*
Visibility when using a permissive MA	Appendix *A.6*
Interpretability of stopping cues	Appendix *A.7*
Train braking performance	Appendix *A.8*
Train driving performance	Appendix *A.9*
Signalling system controls	Appendix *A.10*

Table 2: Factors that affect the likelihood of a train-on-train collision during a permissive train movement

Factor description	Factor reference
Speed of colliding trains	Appendix *A.11*

Factor description	Factor reference
Passenger loadings of colliding trains	Appendix *A.12*
Standing passengers	
Passengers alighting from doors not adjacent to a platform	
Crashworthiness of rail vehicles	
Fire	Appendix *A.13*
Secondary incident	
Type of train involved in secondary incident	
Likelihood of injury or damage arising on the station platform	Appendix *A.14*

Table 3: Factors that affect the consequence of a train-on-train collision during a permissive movement

Rationale

G 2.1.2 The permissive working risk assessment is used to confirm that the provision and use of permissive MA facilities is justified and that the proposed signalling system controls are consistent with controlling train-on-train collision risk to an acceptable level.

G 2.1.3 The factors in Table *1* are included so that the risk assessment considers available options that could eliminate or minimise use of permissive working.

G 2.1.4 The factors in Table *2* describe hazards and hazardous situations that can lead to a train-on-train collision.

G 2.1.5 The factors in Table *3* describe factors that can influence the loss that could arise from a train-on-train collision.

Guidance

G 2.1.6 Transport operators have a legal duty to assess risk and implement safety controls that are sufficient to reduce risk to an acceptable level. The permissive working risk assessment is one of the risk assessments that informs a decision that a planned change can be safely integrated into the operational railway.

G 2.1.7 The permissive working risk assessment confirms that the safety controls used to control the hazard of permissive working are suitable and sufficient.

G 2.1.8 The permissive working risk assessment records the following:

a) The reason for the provision and use of permissive working facilities.
b) Confirmation that there is no reasonably practicable alternative method of satisfying the local operational requirements, for example, using only non-permissive MAs so that every train movement is protected by the signalling system.
c) The safety controls being applied.
d) The rationale for the safety controls.
e) The assumptions, dependencies and caveats that support the decision that the risk of permissive working is acceptable at that location.

G 2.1.9 The record of the permissive working risk assessment is available to be used to inform decisions about future changes to permissive working facilities, or permissive train operations, that might invalidate an assumption, dependency or caveat underpinning the existing system.

G 2.1.10 The decision to provide permissive working facilities takes account of:

a) The extent to which permissive working is necessary to achieve planned train operations, now or in the future.
b) The additional train performance benefit that arises from the availability of permissive working when planned train services are disrupted, or to facilitate one-off or irregular train operations.
c) The acceptability of risk arising when permissive working of trains takes place.

G 2.1.11 Examples of options that can be applied to eliminate or reduce the frequency of PP train movements include:

a) Provision of a mid-platform signal(s) so that a second train movement can be signalled into the platform using a non-permissive MA. Further guidance on mid-platform signals is given in RIS-0703-CCS section 2.8.
b) Configuring the ERTMS/ETCS system so that a second train can be signalled into the platform using Full Supervision (FS).
c) Use of alternative platform lines.
d) Timetabling trains to use platform lines sequentially.
e) Forming complete trains in sidings before entering service.
f) Berthing rail vehicles away from platform lines when not required for a train service.

G 2.1.12 Examples of alternative options for avoidance of PF working include:

a) Provision of intermediate signals, and
b) Provision of additional lines.

G 2.1.13 The permissive working risk can be controlled using a combination of the following:

a) The characteristics of the signalling system that is used to provide permissive MAs.
b) The characteristics of the route(s) on which a permissive MA applies.
c) The infrastructure manager (IM) rules and procedures for using permissive MAs for planned and unplanned train movements.
d) The railway undertaking (RU) rules and procedures for controlling planned and unplanned train movements when a permissive MA is provided.

Guidance on passive provision of permissive working facilities

G 2.1.14 Where a signalling system includes passive provision of permissive working facilities in anticipation of a future operational need, controls are put in place to prevent a permissive MA from being provided to a train until the facility is put into use. Further requirements for disconnecting out of use signalling controls are set out in the IM safety management system.

G 2.1.15 The authority for a signaller to use permissive working is described in the Sectional Appendix to the Rule Book and local operating procedures, for example the Signal Box Special Instructions, which includes any restrictions on use for normal operations or degraded operations.

2.2 Provision of signalling facilities for permissive passenger (PP) working

2.2.1 A signalling system facility to issue a permissive MA to passenger trains shall be provided only for train movements into a station platform.

Rationale

G 2.2.2 This requirement applies the permissive working principle set out in 1.2.8 *a)*.

G 2.2.3 Conformity with this requirement can be applied to reduce the risk consequence set out in *A.13*.

G 2.2.4 Restricting the application of PP working to platform areas limits the scope of use and means that, where it is used, passengers can be de-trained to the platform if there is a train-on-train collision or other operating incident.

Guidance

G 2.2.5 The provision of permissive working facilities at locations other than station platforms is restricted to trains that do not carry passengers.

2.3 Indicating a permissive MA

2.3.1 The information provided by the signalling system shall be sufficient for the train driver to understand the following:

a) That the train has a permissive MA.
b) The route on which the permissive MA applies.

Rationale

G 2.3.2 This requirement applies the permissive working principle set out in 1.2.8 *c)*.

G 2.3.3 Conformity with this requirement can be applied to reduce the risk consequence set out in *A.4*.

G 2.3.4 The rules for train driving when using a permissive MA are different to those that apply when using a non-permissive MA. Train drivers need to be able to interpret the permissive MA in order to understand that the rules for permissive working apply.

G 2.3.5 The train driver needs to be able to interpret which route is set in order to understand which line the permissive MA applies to and to control the speed of the train accordingly.

Guidance on providing a permissive MA using the lineside signalling system

G 2.3.6 The required readable distance (RRD) of the main stop aspect is usually greater than the readable distance of the permissive aspect, which means that the train driver can read the stop aspect before the permissive MA is provided, and will be preparing to stop the train at the signal. The readable distance of the permissive aspect and route indication provides enough time for the train driver to read and interpret the permissive MA.

G 2.3.7 RIS-0758-CCS section 3.4 specifies the appearance of the permissive signal aspects and the information they convey. This includes colour light signalling and semaphore signalling system options:

a) A subsidiary proceed aspect presented by a colour light main stop signal.
b) A 'calling-on' arm in the OFF position presented by a semaphore main stop signal.

G 2.3.8 An alphanumeric route indication can help the train driver to interpret which line the permissive MA applies to. RIS-0758-CCS section 2.6 sets out the requirements for presenting signal aspect and route indication combinations.

G 2.3.9 The lineside signalling system requirements for meeting the permissive working principle described in *b)* are set out in RIS-0703-CCS section 2.5. These include a requirement to delay the permissive signal aspect clearance until the train has almost reached the end of the non-permissive MA and is therefore assumed to have almost stopped.

Guidance on providing a permissive MA using the ERTMS/ETCS

G 2.3.10 Permissive MAs are provided by the ERTMS/ETCS using the On Sight mode (OS). This is consistent with meeting the permissive working principle set out in 1.2.8 *b)*.

G 2.3.11 When a permissive MA is provided by the ERTMS/ETCS, the train speed is supervised as far as the entry to the permissive section. The transition to permissive working occurs when the train transitions to OS. The train speed is supervised to remain below a ceiling speed following the transition to OS.

G 2.3.12 On lines fitted with ERTMS/ETCS and a lineside signalling system, the transition to OS can be beyond the lineside signal used to present the permissive MA to trains that are not operating under ERTMS/ETCS. When it is possible to detect that a train is approaching the entry to the permissive route using an ERTMS/ETCS MA, the permissive signal aspect can be cleared before the train reaches the RRD of that signal aspect.

G 2.3.13 Further requirements for providing a permissive MA using ERTMS/ETCS are set out in *2.4*.

2.4 Configuring a permissive MA using ERTMS/ETCS

2.4.1 An ERTMS/ETCS permissive MA shall include an On sight mode (OS) mode profile covering, as a minimum, the occupied section of line to which the permissive MA applies.

2.4.2 The OS acknowledgement window defined in the OS mode profile shall be configured so that, when the train driver acknowledges the transition to OS, there is enough time to stop the train at the required stopping point using a normal service brake application.

2.4.3 The OS mode profile included in an ERTMS/ETCS permissive MA shall be configured with a Q_MAMODE value = 0.

Rationale

G 2.4.4 These requirements apply the permissive working principles set out in 1.2.8 *a)*, *b)* and *c)*.

G 2.4.5 Conformity with these requirements can be applied to control the likelihood factors set out in *A.4* and *A.10*.

G 2.4.6 The operational rules for train driving when the ERTMS/ETCS onboard subsystem is in OS are consistent with those required for permissive working.

G 2.4.7 The process of transitioning to OS, including train driver acknowledgement and the OS symbol, reinforces the train driver's understanding that the rules for permissive working apply.

G 2.4.8 Although making the Supervised Location (SvL) coincident with the start point of the OS mode profile (Q_MAMODE=1) can eliminate the risk of a collision due to the train driver misjudging a temporary end of authority (EoA), using the SvL derived from the MA (Q_MAMODE=0) can provide operational benefits because:

a) It avoids the more restrictive braking curves associated with using Q_MAMODE=1, and reduces the likelihood of an unexpected brake command approaching the EoA, when a train receives a MA extension that includes an OS mode profile that starts close to that EoA.
b) Using Q_MAMODE=1 can make it difficult for some trains to reach the OS acknowledgement window because the temporary EoA and SvL are at the same location. It might also result in a more conservative approach speed than is necessary to meet safety requirements.

Guidance on using ERTMS/ETCS OS for a permissive MA

G 2.4.9 NOTE: The guidance in this section is intended to describe how OS is applicable to permissive MAs that provide for normal train operations. This guidance does not cover the application of OS for degraded working, for example, to cater for infrastructure defects or to support rescuing a failed train.

G 2.4.10 Under ERTMS/ETCS signalling, trains are normally signalled into a clear section of line using a Full Supervision (FS) MA. If a train movement is to be made into an occupied section of line, the permissive part is conducted with the ERTMS/ETCS onboard equipment in OS. In OS, the rear of the train already occupying the section of line is

not supervised as a stopping point; the train driver is responsible for stopping the train at the required stopping position.

G 2.4.11 The operational requirements relevant to permissive working using ERTMS/ETCS are set out in 2015/995/EU OPE TSI:

a) Appendix A references the ERTMS Operational Principles and Rules; section 6.13 Running in OS, requires the train driver to 'run on sight' when the ERTMS/ETCS onboard is in OS.
b) Appendix B section 9, Running on Sight, describes what is meant by 'run on sight'.

G 2.4.12 The ERTMS/ETCS onboard subsystem provides the following information to the train driver when OS is used for a permissive MA:

a) A change to OS is imminent (request to acknowledge entry to OS).
b) Supervision information relating to the location of the EoA before and after the transition to OS.
c) When the ERTMS/ETCS onboard subsystem is in OS.
d) The OS ceiling speed.

G 2.4.13 The functionality of the transition to OS is dependent on the location of the front of the train relative to the start point of the OS mode profile.

G 2.4.14 If the start point of the OS mode profile is ahead of the front of the train:

a) The start point of the OS mode profile is supervised as a temporary EoA with a SvL, which can be at the temporary EoA or at the SvL of the original MA.
b) When the train enters the OS acknowledgement window, if the train speed is less than the mode related speed defined in the OS mode profile data, the train driver is presented with a request to acknowledge entry to OS.
c) The ERTMS/ETCS onboard subsystem will continue to supervise the train to the temporary EoA/SvL until the train driver acknowledges entry to OS.
d) When the train driver acknowledges entry to OS, the ERTMS/ETCS onboard transitions to OS and the supervision to the temporary EoA/SvL is replaced by supervision to the EoA/SvL defined in the original MA.

G 2.4.15 If the front of the train has already passed the start of the OS mode profile:

a) The ERTMS/ETCS onboard subsystem immediately transitions to OS and the train driver is presented with a request to acknowledge entry to OS.
b) If the train driver does not acknowledge entry to OS within 5 s, the ERTMS/ETCS commands a service brake application, which is released when the train driver does acknowledge entry to OS.

Guidance on configurations for a permissive ERTMS/ETCS MA

G 2.4.16 There are two possible configurations for a permissive ERTMS/ETCS MA:

a) Entering the route in FS mode followed by a transition to OS before the occupied section of line.
b) Entering, and traversing the whole route in OS. This is applicable if there is no separate train detection section between the route entry point and the occupied section of line.

G 2.4.17 The OS acknowledgment window configuration considers the following:

a) The types of train that operate on the line.
b) Where the trains might be brought to a stand by the ERTMS/ETCS onboard equipment supervision.
c) If the start point of the OS mode profile is located at a marked route entry point, where trains will stop in accordance with company train driving policies.

G 2.4.18 Further guidance about variable Q_MAMODE is given in ERTMS/ETCS System Requirements Specification Subset-026 Chapter 7.

G 2.4.19 The OS mode profile start location, distance and speed parameters are provided by ERTMS/ETCS packet 80.

Guidance on the mode related ceiling speed

G 2.4.20 The OS mode related ceiling speed for permissive working is the national value, unless a different speed can be justified by the permissive working risk assessment. For example, a lower ceiling speed value can be applied if it is needed to control the risk factor *A.11*. Alternatively, a higher ceiling speed value might be justified in order to improve operational performance.

G 2.4.21 Implementing a site specific ceiling speed value instead of the national value introduces variation in train driving experience of permissive working, which can increase risk. Mode-related ceiling speeds are not intended to define speed targets for train drivers; however, implementing site specific ceiling speed values might imply that these are target speeds.

2.5 Conditions applicable to train(s) already occupying the section of line

2.5.1 A permissive MA for a passenger train shall be provided only when:

a) The train(s) or rail vehicle(s) already occupying the section of line is assumed to be stationary in the station platform.
b) No MA is provided to the train already occupying the section of line.
c) Permissive working is confined to passenger trains.

2.5.2 A permissive MA for a freight train shall be provided only when:

a) The train movement does not take place within a station platform.
b) The train already occupying the section of line is either assumed to be stationary, or is provided with an MA applicable to the same direction.
c) Permissive working is confined to freight trains.

Rationale

G 2.5.3 These requirements apply the permissive working principle set out in 1.2.8 *a)*.

G 2.5.4 Conformity with these requirements can be applied to control the likelihood factors: *A.5* and *A.7*.

G 2.5.5 The end of the train or rail vehicle already occupying the section of line provides a visual cue, which the train driver uses to determine the stopping position.

G 2.5.6 Driving towards a stationary target helps the train driver to judge the required stopping position. Permitting the first train to move could distract or confuse the train driver using the permissive MA. The requirements applicable to PP working and PF working are different in this area, reflecting the different operational context, benefits and risk of permissive working for passenger train or freight train operations. The permissive working risk assessment is used to inform a decision that the risk of PF working towards a moving train is controlled to an acceptable level.

G 2.5.7 When a train is signalled into a clear section of line using a non-permissive MA, the train driver understands that the line is clear as far as the next stop signal or the end of the ERTMS/ETCS MA. A permissive MA for another train movement in the opposite direction before that train has stopped would infringe the non-permissive MA and increase the likelihood of a head-on collision between two moving trains.

G 2.5.8 The Rule Book, Module TS2 prohibits mixed permissive working of passenger trains and freight trains.

Guidance

G 2.5.9 The need for permissive working is specified by the IM (Network).

G 2.5.10 The authority for a signaller to use permissive working is described in the Sectional Appendix to the Rule Book and local operating procedures, for example the Signal Box Special Instructions, which includes any restrictions on use for normal operations or degraded operations.

G 2.5.11 If the CCS system does not provide positive confirmation that the train already occupying the station platform is stationary, other options for reaching that assumption include:

a) Timed occupancy of a train detection section.
b) Provision of a control device on the station platform, which is used by an authorised person to provide positive confirmation that the train is stationary in that platform.
c) Verbal communication between the signaller and an authorised person, in accordance with operating procedures.
d) Direct visual observation by the signaller.

2.6 Conditions applicable to the section of line to which the permissive MA applies

2.6.1 A permissive MA into a station platform shall be provided only when the section of line is detected to be clear of rail vehicles between the following locations:

a) The start of the permissive MA.
b) The nearest location where the end of a stationary train or rail vehicle can be positioned when a permissive MA is provided for another passenger train to occupy the same platform.

Rationale

G 2.6.2 This requirement applies the permissive working principle set out in 1.2.8 *a)*.

G 2.6.3 Conformity with this requirement can be applied to control likelihood factors: *A.5*, *A.7*, *A.9* and *A.10*.

G 2.6.4 Train drivers would not expect to use a permissive MA for a passenger train movement that requires the train to stop before reaching the station platform.

Guidance

G 2.6.5 The train detection system is used to confirm that the section of line is clear as far as the station platform.

G 2.6.6 Train drivers understand that the rules for using a permissive MA are different from the rules for using a non-permissive MA and that the train stopping position within the station platform can vary depending on the position of the train or rail vehicle already occupying the signal section.

G 2.6.7 Train-on-train collision risk can increase if there is insufficient space within the platform to accommodate the train using the permissive MA.

G 2.6.8 Operational performance can be affected if the space in the platform is insufficient to accommodate another train, for example if the rear of the train is blocking a junction.

G 2.6.9 The train detection system can be used to indicate to the signaller that a predetermined length within the station platform is clear before the permissive MA is provided.

G 2.6.10 Historical practice, at some locations, has been to configure the interlocking to enforce a comparison of the length of the train that will use the permissive MA, with the unoccupied space within the platform. This facility is sometimes known as 'Lime Street control'. The usefulness of Lime Street control is impacted by: the physical and functional limitations of the train detection system, the inconsistency of train lengths and the types of trains being operated.

G 2.6.11 The Lime Street control function can be provided by a traffic management (TM) system or other trackside systems based on received ERTMS/ETCS train data, which includes train length.

2.7 Conditions for providing an MA after a PP movement has completed

2.7.1 An MA shall not be available to a stationary train within a station platform until any passenger train using a permissive MA within the same section of line is assumed to have completed its movement.

Rationale

G 2.7.2 This requirement applies the permissive working principle described in 1.2.8 *d)*.

G 2.7.3 Conformity with this requirement can be applied to control the likelihood factors: *A.5*, *A.7* and *A.9*.

G 2.7.4 Preventing an MA for a further train movement until the train using the permissive MA has stopped, maintains the required train stopping position at the same location

and prevents the train using the permissive MA from receiving an AWS 'bell' indication.

G 2.7.5 Permitting two trains to move within the same platform increases the likelihood of a train-on-train collision, which might arise if the train driver incorrectly anticipates that the train already occupying the signal section will move forwards.

Guidance

G 2.7.6 This requirement is sometimes referred to as 'Huddersfield control'.

G 2.7.7 This requirement can also be applied to control the risk of PF working.

G 2.7.8 Using a timed occupancy of a train detection section is one way of concluding that the train using the permissive MA has stopped. Other means include direct visual observation or indirect reporting in accordance with local operating procedures.

Appendices

Appendix A Guidance on the Factors for Consideration in the Permissive Working Risk Assessment

A.1 Types of permissive working

Guidance

G A.1.1 The permissive working risk assessment takes account of the benefits, the operational context and the risk arising from PP working and PF working, which differ.

G A.1.2 A signal can provide a permissive aspect for a passenger train movement towards a station platform and a permissive aspect for a non-passenger movement towards a different line that does not include a station platform. In this case, routing information is provided so that the train driver can interpret that the permissive MA is valid for the train being operated and that the correct route is set.

G A.1.3 The criteria for PP working mean that it is only provided to signal a passenger train into a station platform that is occupied by another stationary train or rail vehicle(s). PP working is used for either of the following purposes:

a) To couple a passenger train to another train or rail vehicle(s). The coupling operation does not require a permissive MA and is managed in accordance with operating rules after the train has finished using the permissive MA.
b) To allow a passenger train to share the same station platform as another train or rail vehicle(s).

G A.1.4 The criteria for PF working are less stringent but mean that it is not permitted within a station platform. PF working allows:

a) A train to close-up towards another train, typically on the approach to a yard or terminal.
b) A succession of moving trains to follow behind each other on a goods line.

A.2 Frequency of permissive train movements

Guidance

G A.2.1 Frequency, in the context of permissive working, is 'the number of permissive train movements over a period of time' (for example, per day, per calendar year, or per timetable period).

G A.2.2 The following data are relevant when determining the frequency of permissive working:

a) The number of planned permissive train movements.
b) The estimated number of unplanned permissive train movements.
c) The regularity of permissive train movements. The risk might increase if use of permissive MAs is irregular or ad-hoc.

G A.2.3 The *Factors affecting the likelihood of the second train failing to stop short of the first train* and *Factors affecting the consequences from a collision during permissive*

working can be applied in assessing the risk of a single permissive move on a particular line.

A.3 Availability of alternatives to permissive train movements

Guidance

G A.3.1 Permissive working is a hazard; therefore, operating a railway that does not rely on the use of permissive working eliminates this hazard.

G A.3.2 PP working might be necessary to couple trains during a journey. Beyond this scope, PP working is not necessary but might provide justifiable benefits.

G A.3.3 The following can avoid (or reduce the frequency of) PP working:

a) Developing a train plan that does not require coupling of trains in service.
b) Developing a train plan that avoids platform sharing.
c) Providing mid-platform signals to permit the use of non-permissive MAs.
d) Providing additional infrastructure capacity (for example, additional station platforms or loop lines).
e) Stabling, forming and reforming train consists away from running lines, using shunting operations or PF working.

G A.3.4 The permissive working risk assessment can consider the benefits of avoiding secondary risk and issues that might arise when train movements are limited to using non-permissive MAs, for example:

a) Risk of slips, trips and falls when passengers use footbridges and subways to access connecting trains.
b) Poor passenger behaviour due to train delays, cancellations and missed connections.

A.4 Poor interpretability of the permissive MA

Guidance where a permissive MA is provided using the lineside signalling system

G A.4.1 The distinctive appearance of the permissive signal aspect is used to help train drivers correctly interpret the permissive MA. Providing a miniature alphanumeric route indication in combination with the permissive signal aspect can reinforce correct interpretation of the permissive MA and the line to which it applies.

G A.4.2 Conformity with the following lineside signalling system standards is used to inform a decision that the permissive MA is interpretable:

a) RIS-0713-CCS sets out the requirements for confirming that the signalling layout is driveable (which includes interpretability and use of permissive MAs).
b) RIS-0737-CCS sets out the signalling asset parameters and the method of signal sighting assessment used to inform a decision that train drivers will be able to reliably read, interpret and respond to the signal aspects and indications that provide a permissive MA.
c) RIS-0758-CCS specifies the appearance and meaning of permissive signal aspects and alphanumeric route indications.

Guidance where a permissive MA is provided using a cab signalling system

G A.4.3 Further guidance is given in *2.4*.

A.5 Excessive train driver workload during permissive working

Guidance

G A.5.1 After the train has passed the signal presenting the permissive aspect or when an ERTMS/ETCS train is operating in OS mode, the train driver is responsible for controlling the train so that it can be stopped clear of any obstruction.

G A.5.2 The behaviour of the train driver and the train driving workload during the permissive train movement is influenced by:

a) Physical characteristics of the railway infrastructure between the signal and the stopping point.
b) Other task demands on the train driver during the permissive train movement.
c) The train driver's previous experience of permissive and non-permissive movements at that location.
d) The similarity or diversity of train driving experience of permissive and non-permissive operations on this route and other routes.

G A.5.3 Examples of physical characteristics of the railway infrastructure include:

a) The distance to the required stopping position, which impacts on the duration of the movement.
b) The track layout, which can influence the variability in train driving experience and potential destinations.
c) Permissible speed profile, which can influence decisions about changes to train speed during the permissive movement.
d) Gradient, which can impact on traction power and train braking needed to complete the train movement.
e) Curvature of the route, which can affect visibility during the train movement.

G A.5.4 Examples of other task demands on the train driver that affect permissive working risk include:

a) Cab radio functions, including in-cab voice calls, text messages and required responses to radio channel change signs.
b) Traction power functions, including traction changeover and responses to energy infrastructure features such as neutral sections and conductor rail gaps.
c) Interpreting the applicability of lineside operational signs, including those that are only applicable to trains using non-permissive MAs.
d) Interpreting and responding to other in-cab displays and indications, including AWS indications and system failure alarms.

G A.5.5 Achieving consistency in train driving experience of permissive working at each location and throughout each train journey can help to reduce the likelihood of a train-on-train collision; however, consistency can also increase the risk if the train driver becomes habituated through expectation of the required train stopping position.

G A.5.6 Loss of train driving experience of permissive working can arise due to infrequent or ad-hoc application, typically if permissive working is mostly used to facilitate service recovery during periods of disruption. Refresher training and familiarisation can help to maintain train driver's route knowledge and experiences of permissive working.

A.6 Visual cues during the permissive train movement

Guidance

G A.6.1 Visual cues inform the train driver's understanding of the position of the train relative to the required stopping position and decisions about controlling the speed of the train to stop clear of any obstruction at the end of the permissive movement.

G A.6.2 The likelihood of a train-on-train collision can increase:

a) If there are insufficient visual cues.
b) If the visual cues are not distinctive to permissive working.
c) If there is poor visibility of visual cues.

G A.6.3 Visibility in this context is defined as: the ease and reliability with which visual cues can be observed by a train driver throughout the range of operational and ambient conditions applicable to those cues, within the operational context and while performing typical required duties. This ranges from never visible to always visible.

G A.6.4 The following factors support and impact visibility of visual cues:

a) Visibility performance of the visual cues, including trackside features and the end of the train or rail vehicle that is already occupying the section of line.
b) Obscuration of visual cues, including other trains and the impact of rain, fog and falling snow.
c) Inadequate cab sight lines, including the impact of dirt on the windscreen.
d) Reflections and glare.
e) Excessive or insufficient illumination in the environment, including the impact of sudden changes and shadows.
f) Low background contrast.
g) Complex background.
h) Lineside distractions, including physical structures, lineside signals and signs, people, other trains and station operations.
i) High train driver workload.

G A.6.5 RIS-0737-CCS Appendices A, B and C give further guidance about these factors in the context of their applicability to signal sighting assessment.

A.7 Poor interpretability of visual cues

Guidance

G A.7.1 The required train stopping position can be different each time a permissive train movement is made. The train driver has to interpret the required train stopping position using visual cues that are not controlled by the signalling system. The

operating requirements relevant to the stopping position are set out in Rule Book module TW1.

G A.7.2 Poor interpretability of visual cues increases the likelihood of train-on-train collision. The likelihood might increase if the required stopping position is different on each occasion, or if the required stopping position is only a short distance beyond the first visual cue.

G A.7.3 The visual cues are assessed to confirm that train drivers will be able to obtain sufficient information, with sufficient time to inform a controlled approach to a clearly defined stopping point, taking account of the operational context applicable to the permissive movement.

G A.7.4 The following visual cue is always relevant: the nearest end of the train or rail vehicle already occupying the signal section. The interpretability of the position of the train or rail vehicle already occupying the signal section is supported by the visibility of the nearest end of the nearest rail vehicle. This is usually indicated using a headlamp(s) or a tail-lamp(s). Visibility can be further enhanced by ambient illumination such as platform lighting.

G A.7.5 Multiple visual cues on the approach to the required stopping position provide opportunities for train drivers to recover from any errors that may occur during the permissive train movement.

G A.7.6 Other visual cues that can help the train driver confirm the position of the train using the permissive MA within the track layout include fixed assets such as:

a) The running-in end of the station platform (PP working).
b) Points.
c) Fixed infrastructure, for example a bridge or level crossing.
d) Lineside signs.

G A.7.7 If the approach to the required stopping point is curved, lineside structures or rail vehicles (moving or stationary) might obscure the available visual cues, reduce their visibility or delay the time that they are visible.

G A.7.8 The interpretability of all available visual cues is also influenced by the factors set out in *A.6*.

A.8 Inadequate train stopping performance

Guidance

G A.8.1 Inadequate train stopping performance during a permissive train movement increases the likelihood of a train-on-train collision because the required stopping point is denoted by the end of a rail vehicle and there is no safe overrun distance provided by the IM.

G A.8.2 A train-on-train collision during a permissive movement can be caused by:

a) Insufficient or late brake application by the train driver.
b) Poor wheel-rail adhesion when the train brakes are applied.

G A.8.3 Because the required train stopping point is not indicated by a fixed stop signal or buffer stop, or defined and supervised as an ERTMS/ETCS EoA, permissive working places more reliance on the train driver to work out, on each occasion, when and where to apply the brakes in order to avoid a collision, whilst at the same time reaching the required stopping position. If the brake application is insufficient or too late, the train will not have enough time (and distance) to stop. If the brakes are applied too early, a subsequent application of power to accelerate the train might result in a misjudgement of brake application.

G A.8.4 Rail contamination can reduce wheel-rail adhesion. Typical causes include:

a) Foliage.
b) Oil from standing rail vehicles, for example where stationary trains occupy station platforms for long periods.
c) Fallen debris, for example material that can fall from wagons on the approach to a freight terminal.

A.9 Train driving human error

Guidance

G A.9.1 Train driver human error when controlling a permissive train movement increases the likelihood of a train-on-train collision because the signalling system does not indicate the stopping position, there is limited (ERTMS/ETCS) or no train protection functionality and there is no safe overrun distance.

G A.9.2 The likelihood of train driver error increases if the permissive MA is difficult to drive. The extent to which the infrastructure layout influences human error is assessed to understand how it will impact on the performance of the train driver using the permissive MA.

G A.9.3 Previous experience of permissive working can be of benefit if the train driver can rely on that previous experience when controlling the train during the permissive movement. However, previous experience might have an adverse effect if it leads to an incorrect expectation of the route that is set or the required stopping point.

G A.9.4 Permissive working risk can increase if the information provided to the train driver is insufficient to inform the train driving task, or conflicts with train driver expectation.

G A.9.5 The driveability of the permissive MA is supported and influenced by the factors set out in Table *1* and Table *2*.

G A.9.6 The following infrastructure parameters are assessed because they can impact on the driveability of a permissive MA:

a) Distance from the point at which permissive working starts (the signal providing the permissive MA or the transition to OS mode) to the required stopping point.
b) Number and visibility of visual cues.
c) Number of alternative signalled routes towards the destination, including alternative platforms.
d) Number of alternative signal routes towards the designated stopping point.
e) Curvature of the track.

f) Gradients.
g) Permissible speeds.
h) Electrification system features, for example neutral sections and 3rd rail gaps.

G A.9.7 The following train parameters are assessed because they can impact on the driveability of a permissive MA:

a) Train braking performance.
b) Train acceleration performance.
c) Train length and consist.
d) Train type.
e) Train driver human factors.

G A.9.8 Increasing the distance between the signal and stopping point increases:

a) The duration of the permissive train movement and the opportunity for train driving errors of all types.
b) The duration that the train driver has to maintain awareness of the permissive move. This awareness relates to short-term memory and will decay over time, meaning that the likelihood of losing awareness increases with the distance between the protecting signal and the stopping point.
c) The duration for which visual cues are not visible increases the likelihood of losing awareness.

G A.9.9 On the approach to a station with a complex track layout, where there are multiple platforms or where alternative routes are provided to the same station platform, each route is assessed separately because the driveability of each route can be different.

G A.9.10 The approach to a large station may be through a tunnel, over complex pointwork, and with changes of gradient and curves. Issues may arise due to the train speed profile from the protecting signal to the final stopping point being affected by a change in gradient, for example, a hump or a dip, with the possibility that parts of the train may be simultaneously on different gradients.

A.10 Signalling errors

Guidance

G A.10.1 The likelihood of a train-on-train collision can be influenced by errors in signaller actions or the functionality of the signalling system.

G A.10.2 Not all existing lineside signalling systems on the GB mainline railway conform with the requirements set out in this document; permissive working controls at some locations are implemented using operational rules.

G A.10.3 The permissive working risk assessment includes the impact of human error, for example providing a permissive MA:

a) When this is not authorised in the operating rules for the type of train operation.
b) Too early, before the train is on the immediate approach to the signal or before the train already occupying the signal section has stopped.

c) When there is insufficient capacity in the station platform or signal section to accommodate another train.

G A.10.4 Where the signaller is required to confirm that a station platform has sufficient capacity to accommodate another train, the following options are available:

a) Provision of Lime Street, or similar, controls. Further guidance is given in section *G 2.6.10*.
b) Provision of train detection indications without Lime Street controls.
c) Direct observation, or indirect observation using real-time video imaging.
d) Verbal communication with authorised personnel.

G A.10.5 Where an axle counting system is used to estimate the number of vehicles in a platform, the use of this system takes into account any train formations that might result in misleading indications, for example if some train consists incorporate two-axle or articulated vehicles, or rail vehicles of varying lengths.

G A.10.6 At some locations the automatic route setting (ARS) system or traffic management system (TMS) is configured to set calling-on class signal routes. The data configuration is assessed to confirm that it will conform with the rules for signalling trains into occupied sections of line. The capability of the signaller to intervene to inhibit ARS/TMS functions is also assessed.

A.11 Train speed

Guidance

G A.11.1 The permissive working risk assessment considers the speed of the train using the permissive MA when the collision occurs. Conformity with section *2.5* means that the train(s) already occupying the section of line is stationary with the brakes applied.

G A.11.2 The factors set out in Table *2* can influence the speed of the train using the permissive MA.

A.12 Passenger train loadings

Guidance

G A.12.1 The seriousness of the accident is influenced by:

a) The speed of the collision.
b) The rolling stock types.
c) The number of standing passengers.
d) The location of standing passengers, for example whether they are within the vehicle ends preparing to alight at the station.

G A.12.2 Passenger loadings can vary throughout the day or at different times of the year, depending on the location and line of route. For example, more people use London termini during rush hours, and the amount of leisure travel on many routes can significantly increase at weekends and during holiday periods.

G A.12.3 Passengers are more likely to be standing within the train using the permissive MA if it is on the approach to a station where many people alight, where the train will terminate or if the train is overcrowded (for example during a rush hour).

G A.12.4 Passenger injuries can result from structural damage to the rail vehicle, seat or table displacement, luggage falling from overhead racks or items projected from tables. The consequence is influenced by the rolling stock type and its interior design.

G A.12.5 The likelihood of injuries to passengers as a consequence of permissive working can be balanced against the risk from slips, trips and falls where passengers have to negotiate bridges or subways as a result of trains, which could have shared a platform, being accommodated at different platforms.

A.13 Secondary risks

Guidance

G A.13.1 The permissive working risk assessment considers the risk of a secondary incident arising from the train-on-train collision. Examples of secondary incidents, which might result in loss include:

a) Another train-on-train collision when an adjacent line is obstructed as a consequence of the first collision.
b) Fire.
c) A collapsed structure.
d) Incidents when people alight from a train to the track.

G A.13.2 The likelihood of a secondary collision is influenced by:

a) The location of the first collision, for example, if part of a train is not adjacent to a station platform.
b) The outcomes of the first collision, including passenger behaviour when alighting from the colliding trains.
c) The time of the first collision relative to other train movements at that location.
d) The response to the first collision, for example, the ability to stop other trains.

G A.13.3 The consequence of a secondary collision is influenced by:

a) The types of train involved.
b) The speed of trains when the collision occurs.
c) The consist and loading of the affected trains, for example the number of passengers or a freight train carrying hazardous goods.
d) The location.
e) The time that has elapsed since the first collision.
f) Emergency response to the collision.

A.14 Terminal and bay platforms

Guidance

G A.14.1 A train-on-train collision in a terminal or bay platform might result in a secondary buffer stop collision.

G A.14.2 Stationary rail vehicles might be pushed onto the station concourse. The likelihood of damage or injury from standing vehicles being pushed through the buffer stops depends on the speed of the colliding train, the layout of platform furniture, including kiosks or seats, and the location of people on the station concourse.

G A.14.3 Further guidance on assessing and controlling buffer stop collision risk is given in GIGN5633

Definitions

Automatic Route Setting (ARS)	A system for setting Routes without the action of the Signaller, based upon a stored timetable, train running information, defined priority, selection criteria and operating algorithms.
Automatic Warning System (AWS)	A system that gives train drivers in-cab warnings of the approach to signals, reductions in permissible speed and temporary / emergency speed restrictions, and to apply the brakes in the event that a train driver does not acknowledge cautionary warnings given by the system within the specified time. *Source: GERT8075*.
Cab signalling system	A type of signalling system that presents information about movement authorities, routing, equipment status, operational information and changes in permissible speeds using in-cab displays.
Ceiling speed	A predetermined speed value, applicable during ceiling speed monitoring, above which a train would trigger an ERTMS/ETCS overspeed warning.
Coupling operation	The process of connecting multiple rail vehicles together so that they can operate as a single train.
Drive / Train driving	The human tasks and processes necessary to control the movement of a train in accordance with operating rules and procedures.
End of Authority (EoA)	An End of Authority is a location to which the train is permitted to proceed and where target speed = zero.
ERTMS	European Rail Traffic Management System.
ETCS	European Train Control System.
Freight Train	Trains signalled as classes 3 to 8 and 0. By this definition, light engines and trains comprising empty coaching stock or parcels trains, are permitted to use facilities provided for freight trains.
Full Supervision mode (FS)	ERTMS/ETCS on-board equipment mode giving full protection against overspeed and overrun.
Hazard	A condition that could lead to an accident. *Source: CSM RA.*
Huddersfield control	A CCS system feature that prevents a train from receiving an MA until the train using a permissive MA within the same signal section has completed its movement.
Interpret / interpreting (signalling system displays)	The action of understanding the information conveyed by the signal aspect or indication after it has been read (for example, understanding that a red signal aspect means ‘limit of MA’).
Interpretability	The ease and reliability with which signal aspects and indications can be interpreted by an authorised user throughout the range of operational and ambient conditions applicable to that feature, within the operational context and while performing typical

	required duties. This ranges from never interpretable to always interpretable.
Interpretable (signalling system displays)	The extent to which the information conveyed by a signal aspect or indication can be reliably interpreted, ranging from not interpretable to easily interpretable.
Lime St control	A CCS system feature that uses train detection system information to estimate train length and the available space in an occupied station platform, to determine whether a signal can be cleared to a proceed aspect.
Lineside signalling system	A type of signalling system that presents information about movement authorities, routing, equipment status, operational information and changes in permissible speeds using lineside displays. The system is configured using the following asset types: a) Signals. b) Route indicators. c) System status indicators. d) Train dispatch system indicators. e) Some types of lineside operational sign.
Mode related speed	The ceiling speed value defined for use during operation by the national value for the following ERTMS/ETCS modes: SR, OS, RV, UN and SH. The ceiling speed values are defined by national values, which can be overridden by the ERTMS/ETCS trackside subsystem or, for SR mode, by the train driver.
Movement authority (MA)	The authority given by a signaller (or ground frame operator), issued via the signalling system to the train driver, which is the authority to move the train within defined limits.
Non-permissive MA	Authority for a train to proceed into a signal section that is not occupied by other rail vehicles.
On Sight mode (OS)	ERTMS/ETCS on-board equipment mode that gives the train driver partial responsibility for the safe control of their train. In this mode the train possesses a movement authority but the track ahead might be occupied by another train.
OS acknowledgement window	The opportunity given to the train driver to acknowledge a transition to OS.
OS mode profile	Data received from the ERTMS/ETCS trackside subsystem, which define: a) The start point of the 'on-sight' area b) The length of the 'on-sight' area c) OS acknowledgement window parameters d) The applicable OS mode related speed.

Permissive Freight (PF)	An operation that involves more than one train occupying the same section of line that is not within a platform.
Permissive MA	Authority for a train to proceed into a signal section that is occupied by a rail vehicle.
Permissive Passenger (PP)	An operation that involves more than one passenger train occupying the same section of line within a station platform.
Permissive train movement	A train movement into a signal section that is occupied by other rail vehicles.
Permissive working	A method of signalling a train movement into a section of line that is occupied by another train or rail vehicle(s).
Platform Sharing	Permitting two or more passenger trains to simultaneously occupy the same signalling section within a station platform, other than for the purposes of attaching, detaching or removing vehicles, without the existence of a mid-platform signal or limit of MA.
Proposer	Proposer means the railway undertakings or the infrastructure managers in the framework of the risk control measures they have to implement in accordance with Article 4 of Directive 2004/49/EC, the contracting entities or the manufacturers when they invite a notified body to apply the 'EC' verification procedure in accordance with Article 18(1) of Directive 2008/57/EC or the applicant of an authorisation for placing in service of vehicles.' (Article 3, clause 11). *Source: Commission Regulation (EC) No 352/2009 (Article 3, clause 11).*
Q_MAMODE	An ERTMS/ETCS variable relevant to the configuration of an OS mode profile.
Required readable distance (RRD)	The readable distance that is maintained for each lineside signalling asset.
Required stopping position	The infrastructure location at which the train driver is required to stop the train. This can be at a specified infrastructure location or a position relative to something else, for example the end of a train or rail vehicle.
Risk assessment	The overall process comprising a risk analysis and a risk evaluation. *Source: CSM RA.*
Route indication	A display of specified appearance that is used to conveying routing information to a user.
Shunting MA	Authority for a train to proceed for shunting operations.
Signal aspect / indication	A display of specified appearance that is used to convey a specific set of information to a user.
Stop aspect	A signal aspect that denotes a limit of MA.
Stop signal	A signal that is capable of presenting a stop aspect.

Supervised location (SvL)	Supervised Location, which could be defined on-board as the end of the overlap, the Danger Point, or the End of Authority.
Traffic Management System (TMS)	A system that can automatically set routes for trains, log train movements, and resolve potential conflicts.
Train	A train is defined as (a) traction unit(s) with or without coupled railway vehicles, including light locomotive and self-propelled rail vehicle operating in rail mode, with train data available operating between two or more defined points.
Train-on-train collision	An instance of a train striking another train or train vehicle when this is not authorised (for example, when coupling is not the intention).
Transport operator	An infrastructure manager or railway undertaking that must implement the requirements in this standard.
Visibility	The ease and reliability with which something can be seen throughout the range of applicable operational and ambient conditions, within the operational context and while the observer is performing typical required duties. This ranges from never visible to always visible.
Visual cue	A visible feature that provides an accurate source of information to inform understanding of what action might be needed.

References

The Standards catalogue gives the current issue number and status of documents published by RSSB: http://www.rssb.co.uk/railway-group-standards.

RGSC 01	Railway Group Standards Code
RGSC 02	Standards Manual

Documents referenced in the text

Railway Group Standards

GERT8000	Rule Book
GERT8075	AWS and TPWS Interface Requirements

RSSB Documents

GCRC5633	Recommendations for the Risk Assessment of Buffer Stops, Arresting Devices and End Impact Walls
GEGN8646	Guidance on the Common Safety Method for Risk Evaluation and Assessment
GEGN8651	Rail Industry Guidance Note for Safe Integration of CCS Systems with Train Operations
GIGN5633	Recommendations for the Risk Assessment of Buffer Stops, Arresting Devices and End Impact Walls
RIS-0703-CCS	Signalling Layout and Signal Aspect Sequence Requirements
RIS-0708-CCS	ERTMS/ETCS National Values
RIS-0713-CCS	Lineside Signalling Layout Driveability Assessment Requirements
RIS-0737-CCS	Signal Sighting Assessment Requirements
RIS-0758-CCS	Lineside Signal Aspects and Indications
RSSB-ERTMS-OC	Operational Concept for ERTMS

Other References

EC 352-2009	Regulation on a common safety method for risk assessment
ERTMS/ETCS reference design topic H	Permissive moves
ERTMS/ETCS Subset-026	ERTMS/ETCS System Requirements Specification
ISBN 07176 2727 6	Railway Safety Publication 3, Office of Rail Regulation, 2007
OPE TSI	Operation and Traffic Management TSI, Decision number 2007/756/EC amended by 2012/757/EU and 2012/995/EU (OJ

	L305, 23.11.2007, p30 amended by L345, 15.12.2012, p1 and OJ L165, 30.6.2015, p1)
ROGS	The Railways and Other Guided Transport Systems (Safety) Regulations 2006