

RAILTRACK

*Safety & Standards***SAFETY JUSTIFICATION****ISSUE: I****PART 1 - DOCUMENT INFORMATION****Document Title:** **Braking System and Performance for Trains Above 125 mile/h****Document No:** GM/RT2046 **Issue:** One**Primary Subject Committee:** T&RS**Other Subject Committee input/ involvement:** TC&C**Proposed Date of Submission to Subject Committees:** 22 October 1999 and 28 October 1999**Submitted by:** **Standards Project Manager** **Date:** 10/08/99**Reviewed by:** **Controller, Safety, Strategy and Planning** **Date:** 24/08/99**Approved by:** **Controller, Railway Group Standards** **Date:** 24/08/99**PART 2 - EXECUTIVE SUMMARY**

The existing braking performance Standards only define acceptable stopping distances for speeds up to a maximum of 125 mile/h. The proposed introduction of high speed trains operating at speeds in excess of 125 mile/h means that there is a requirement to define acceptable stopping distances from these higher speeds.

The trains that will operate at speeds above 125 mile/h will generally be fixed or semi-fixed formations that can have distributed power systems. They are thus not locomotives and coaches nor do they fit within the existing definition of multiple units. It is thus proposed to generate an additional Standard covering the braking system and performance for trains when operating above 125 mile/h.

PART 3 - BACKGROUND**Need for change**

The advent of trains onto Railtrack's infrastructure whose maximum speed is greater than 125 mile/h requires their braking systems and performance to be defined by Railway Group Standards.

Currently for braking there is one Standard GM/RT2045 that defines the principles and four other Standards covering the performance of coaches, traction units, freight vehicles and multiple units. These are GM/RT2041, GM/RT2042, GM/RT2043, GM/RT2044 respectively.

The new trains that will operate at speeds above 125 mile/h do not fit easily within the definition of vehicles and trains in the above Standards and a new Standard is therefore proposed to cover these higher speeds.

Proposed changes

The additional Standard GM/RT2046 is proposed specifically to cover the braking system and performance for trains operating at speeds in excess of 125 mile/h. It does not cover braking requirements for speeds not exceeding 125 mile/h

The production of GM/RT2046 means that there will need to be some minor changes to the existing braking Standards, principally changes relating to cross referencing and amendments to the definitions. These Standards affected are GM/RT2141, GM/RT2042, GM/RT2044 and GM/RT2045.

Controls and their function

GM/RT2046 supports the need to ensure that rail vehicles can operate safely at high speed by defining the minimum acceptable brake system and stopping distance performance requirements for trains operating at speeds greater than 125 mile/h. In particular, this new Standard addresses 4 key controls:

- Braking Distances – it sets out maximum stopping distances utilising brake performance of 6%g for speeds above 125 mile/h, which take into account the lower levels of adhesion at these higher speeds, without undue risk of SPADs or overspeed at speed restrictions;
- Emergency Brake – that driver application at a higher rate will give the shortest stopping distance likely to be achieved without experiencing a brake rate change at 125 mile/h;
- Control Systems – that generally reflect the characteristics of multiple unit braking requirements whereas higher speed trains would not otherwise be expected to be classified as multiple units for braking purposes;
- Parking Brake – the requirement to provide parking brake indicators to seek to reduce the risk of wheel flats which are more critical as speed increases.

Complementary controls

GM/RT2046 supports GM/RT2045 “Braking Principles for Rail Vehicles” by covering the brake system and performance of trains operating at speeds greater than 125 mile/h. The Standard is complementary to the following Standards, which cover relevant requirements for speeds not exceeding 125 mile/h.

GM/RT2041	Braking System and Performance for Trailer Coaching Stock
GM/RT2042	Braking System and Performance for Traction Units
GM/RT2044	Braking System and Performance for Multiple Units

PART 4 - COSTS AND BENEFITS

GM/RT2046 mandates the brake system and performance requirements of trains travelling at speeds greater than 125 mile/h. These requirements are not covered by existing Railway Group Standards, therefore it is considered that a quantified Cost Benefit Analysis is not appropriate in this case.

The benefit of this Standard is that it will facilitate the safe operation of trains, with respect to brake performance, at speeds in excess of the existing 125 mile/h maximum speed applicable on the Railtrack controlled infrastructure.

The current braking rate of 9%g at up to 125 mile/h equates directly to 7%g at over 125 mile/h for the same likelihood of not achieving adhesion on demand. However a brake performance of 6%g has been used in the calculation of the braking distances for the following reasons:

- At higher speeds the consequences of failure to achieve adhesion could be greater than at a lower speed.
- Train Operators have expressed a desire to operate the new trains closer to their theoretical braking curve on a greater number of occasions than at the present time for main line trains.
- This choice of braking rate is widespread on other railway administrations.
- The existing trains operating on Railtrack controlled infrastructure that were designed to operate at over 125 mile/h were designed with this level of brake performance.
- The new trains currently under construction utilise this level of brake performance.

The brake demand requirements of GM/RT2046 are therefore considered to be the most effective and those which minimise any costs.

PART 5 - CONCLUSION

GM/RT2046 forms part of a set of Standards aimed at controlling the risk following the introduction of trains capable of operating at speeds greater than 125 mile/h.

The proposed changes set out to define the braking requirements to ensure safe operation of the trains at speeds which are not covered by any of the existing Standards. It is therefore concluded that the change is justified.
