

Structural Requirements For Drawgear And Buffers On Railway Vehicles

Submitted by

Signatures removed from electronic version

.....
D. Boocock
Nominated Responsible Manager

Approved by

.....
J. R. Mitchell
Chairman, Traction and Rolling Stock Subject Committee

Authorised by

.....
K. W. Burrage
Controller, Safety Standards

Synopsis

This standard prescribes the strength requirements for drawgear and buffers on railway vehicles. It covers both traction and rolling stock and on-track machines.

This document is the property of Railtrack. It shall not be reproduced in whole or in part without the written permission of the Controller, Safety Standards.

Published by
Safety & Standards
Directorate
Railtrack
Railway Technical Centre
London Road
Derby

© Copyright 1994 Railtrack

This page is intentionally blank.

Structural Requirements For Drawgear And Buffers On Railway Vehicles

Contents

Section	Description	Page
Part A	Issue record	2
	Responsibilities and distribution	2
	Implementation	2
	Disclaimer	2
	Supply	2
Part B		
1	Purpose	3
2	Scope	3
3	Definitions	3
4	Drawgear	4
5	Buffers	4
6	Verification	4
Appendices		
A	Strengths of Drawgear in Current Use	5
References		7

Structural Requirements For Drawgear And Buffers On Railway Vehicles

Part A

Issue record

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

Amended or additional parts of revised pages will be marked by a vertical black line in the adjacent margin.

Issue	Date	Comments
1	Aug 94	Original Document (draft was numbered GM/TT0302)

Responsibilities and distribution

This standard applies to Train Operators that operate or propose to operate railway vehicles on Railtrack lines. Train Operators shall ensure that the provisions of the standard are communicated to all associated organisations and persons with responsibilities for vehicles and vehicle structures in the fields of technical specification, design, development, procurement, testing, maintenance and Engineering Change.

Implementation

The provisions of this standard are mandatory. The standard shall be applicable from 1 December 1994 to all new procurement contracts for new vehicles and to all new programmes involving Engineering Change to existing vehicles.

Disclaimer

The Safety & Standards Directorate (S&SD) shall use its best endeavours to ensure that the content, layout and text of its standards are accurate, complete and in line with current best practice insofar as is reasonably practicable. It makes no warranties, express or implied, that compliance with all or any of its standards shall be sufficient to ensure safe systems of work or operation. The S&SD will not be liable to pay compensation in respect to the content or subsequent use of its standards, except where it can be shown to have acted in bad faith or there has been wilful default.

Supply

Controlled and uncontrolled copies of this standard must be obtained from the TDCC Manager, Document Services, Railway Technical Centre, London Road, Derby, DE24 8UP.

Structural Requirements For Drawgear And Buffers On Railway Vehicles

Part B

1. Purpose This standard prescribes the strength requirements for drawgear and buffers on railway vehicles to ensure safety under normal operating conditions and to minimise risks to people in the event of a derailment or other accidents.

2. Scope The requirements of this standard apply to all new traction and rolling stock vehicles and on-track machines operating on Railtrack lines. The requirements apply also to existing vehicles undergoing Engineering Change insofar as it is reasonably practicable to incorporate them.

3. Definitions

Adaptor Coupling
A coupling that enable two railway vehicles with dissimilar coupling systems to be coupled together in an emergency.

Automatic Coupler

A fitting on the end of a railway vehicle that engages with a compatible fitting on an adjacent railway vehicle by the action of propelling the vehicles together, and which enables longitudinal tensile and compressive forces to be transferred between adjacent vehicles.

Buffer

A fitting on the end of a railway vehicle designed to enable longitudinal compressive forces to be transferred between adjacent vehicles. Buffers may either be mounted at the sides as separate units or incorporated in the drawgear.

Drawgear

A set of fittings used to connect railway vehicles for the purpose of transmitting longitudinal forces between adjacent vehicles; connection may be made manually or by means of an automatic coupler.

Engineering Change

Any alteration or modification to the design of a vehicle that affects its technical performance, particularly where it influences structural behaviour and strength characteristics.

On-Track Machine

A rail-mounted machine permitted by the Rule Book (BR 87109) to be moved, either self-propelled or in train formation, outside a possession.

Structural Requirements For Drawgear And Buffers On Railway Vehicles

Traction Unit

A powered vehicle able to move itself and other vehicles to which it may be coupled.

4. Drawgear

4.1

Drawgear shall withstand without rupture the maximum longitudinal forces caused by coupling and by traction and braking, on both straight and curved track, together with any shock loadings caused by play and flexibility in the train coupling systems.

4.2

The strength of drawgear, and its attachment to the vehicle body, shall as far as is practicable be less than the longitudinal tensile forces at the coupler positions on vehicle bodies, as prescribed in reference [1]. Examples of proof and ultimate strengths of drawgear in current use are listed in Appendix A.

4.3

Drawgear and its attachment to a vehicle body shall, where applicable, be designed to ensure that the requirements of reference [1] for body structural collapse and energy absorption are satisfied.

4.4

Drawgear which is designed to be capable of transferring shear forces between adjacent vehicles shall withstand without permanent deformation the transfer of 100 kN in both the vertical and transverse directions simultaneously. See reference [1].

5. Buffers

5.1

As far as is practicable, the strength of buffers and their attachments to the vehicle body shall, under axial loading, be the same as the longitudinal compressive forces at the buffer and coupler positions (as appropriate) on vehicle bodies, as prescribed in reference [1].

5.2

Buffers shall withstand without loss of structural integrity the contact forces associated with coupling, traversing curved track, traction and braking, and any shocks caused by play and flexibility in the train coupling and buffing systems.

6. Verification

The structural adequacy of new designs of drawgear shall be verified by testing. The adequacy of buffer strength shall be established by calculations, by comparison with other vehicles, by testing or by other means as appropriate.

Structural Requirements For Drawgear And Buffers On Railway Vehicles

Appendix A

Strengths Of Drawgear In Current Use

This appendix is for information only. The following list is not exhaustive.

Item	Proof Force (kN)	Ultimate Force (kN)
Locomotive Draw Hook (Drg. No. B2-S-9010053)	700	1200
Wagon Draw Hook (Drg. No. UIC/ORE/BR 170M 3211 0001)	710	1220
Wagon Draw Hook (Drg. No. STD 1408)	710	1220
Wagon Draw Hook (Drg. No. C1-A1-9006711)	710	1220
Freightliner Draw Hook (Drg. No. F-A0-16289)	510	1020
Wagon Draw Hook (Drg. No. RCH 1044)	710	1220
Wagon Tailpin (Drg. No. UIC/ORE/BR 170M 3214 0001)	710	1220
Locomotive Draw Hook (Drop Head Buckeye) (Drg. No. B1-A0-9009628)	600	1000
Coach Draw Hook (Drop Head Buckeye) (Drg. No. B1-S-9012629)	300	750
Locomotive Screw Coupling (Drg. No. L-A0-1475)	710	1220
International Screw Coupling (Drg. No. C1-A2-9000275)	710	1220
Freightliner Heavy Duty Screw Coupling (Drg. No. F-A2-3546)	510	1020
Fitted Wagon Screw Coupling (Drg. No. F-A0-13970)	710	1220
Instanter Coupling (Drg. No. SW/SW/1165)	710	1220
Tightlock Coupler (Knuckle)	1450 [1]	2360 [1]
Tightlock Coupler (Body)	1800 [1]	3080 [1]
BSI Coupler (CK2)	-	850 [2]
Adaptor Coupling (eg. Drg. No. L-A0-7486)	300	-
Bar Coupler (Drg. No. Arbel 1605113)	710	1220
Bar Coupler (Drg. No. Powell Duffryn Standard MA12963)	710	1220

Structural Requirements For Drawgear And Buffers On Railway Vehicles

Notes:

[1] Manufacturer's information based on the results of tests according to the procedures of the Association of American Railroads (AAR). The strength of a complete coupler assembly, as installed in a vehicle, will be governed by components such as pins. The overall strength is therefore likely to be comparable with the strength of draw hooks and screw couplings.

[2] Manufacturer's published information. Actual value likely to be of the order of 1000 kN. Proof force in compression, 1500 kN.

Structural Requirements For Drawgear And Buffers On Railway Vehicles

References

- [1] GM/RT**2100** Structural Requirements for Railway Vehicles

Related documents

- GM/TT0401 Rail Vehicle Mechanical Coupling Systems
- GM/RC**2504** Commentary on Structural Requirements for Railway Vehicles