

2nd edition, September 2010

Translation

R

Recommendations for the design of bridges to satisfy track requirements and reduce noise emissions

Recommandations concernant la conception des ponts pour tenir compte des exigences relatives à la pose et à l'entretien de la voie et pour réduire les émissions de bruit

Empfehlungen für die Konstruktion von Brücken unter Berücksichtigung oberbautechnischer Anforderungen und zur Abminderung der Schallemission



UNION INTERNATIONALE DES CHEMINS DE FER
INTERNATIONALER EISENBAHNVERBAND
INTERNATIONAL UNION OF RAILWAYS

Leaflet to be classified in Volume:

VII - Way and Works

Application:

With effect from 1 July 1995

All members of the International Union of Railways

Record of updates

1st edition, July 1995

First issue

2nd edition, September 2010

Computerisation of Leaflet (1st edition, July 1995).

NB: the contents of the July 1995 edition have not been changed.

The person responsible for this leaflet is named in the UIC Code

Contents

Summary	1
1 - Introduction	2
2 - Requirements for trackwork across bridges	3
2.1 - Introduction	3
2.2 - Vehicle and operating requirements	3
2.2.1 - Introduction	3
2.2.2 - Means of ensuring track continuity	3
2.2.3 - Direct track fixing	4
2.2.4 - Operating requirements	5
3 - Case of steel bridges	6
3.1 - Introduction	6
3.1.1 - Accessibility	6
3.1.2 - Maintenance operations	6
3.1.3 - Requirements for mechanised track maintenance	6
3.2 - Track maintenance	6
3.3 - Maintenance of the structure	7
3.4 - Requirements for ballasted track	7
3.4.1 - Depth of ballast below sleepers	7
3.4.2 - Protection of the bridge-deck waterproofing	7
3.4.3 - Enclosure of ballasted decks	7
3.5 - Components at the ends of a bridge	8
4 - Measures to reduce noise and vibrations	9
4.1 - General comments on noise generation	9
4.1.1 - Sources of noise	9
4.1.2 - Noise produced by rolling stock	9
4.1.3 - Noise emitted by the track	9
4.2 - Transmission of vibrations and radiation of noise	9
4.2.1 - General	9
4.2.2 - Transmission of vibrations	10
4.2.3 - Radiation of noise	10

4.3 - Measures to limit the generation and radiation of noise	10
4.3.1 - Main requirements	10
4.3.2 - Basic principles	11
4.3.3 - Measures specific to the track	11
4.3.4 - Measures specific to the supporting structure	12
Appendix A - Ballasted track laid on steel bridge	13
Appendix B - Ballasted track on reinforced concrete bridge	14
Bibliography	15

Summary

This leaflet contains relevant guidelines for the design of railway bridges in order to meet traffic requirements, given the need to minimise not only track maintenance work but more importantly track maintenance on bridges and their abutments. The importance of reducing noise levels is also highlighted.

The leaflet recommends that bridge design should also allow for longitudinal forces emitted via the rails, and caused by temperature variations or on train braking or again during initial acceleration.

Details are also given of the measures to be adopted as regards:

- the thickness of ballast under sleepers;
- the enclosure of ballasted bridge decks.

The appendices to the leaflet provide examples of ballasted-track laying on concrete or steel bridges, complete with recommended dimensional values.

1 - Introduction

The construction of new bridges must take account of requirements for the installation and maintenance of permanent way that will be laid across them.

It is also recommended that the design of any new bridge should include appropriate measures for limiting the radiation of noise and vibration to satisfy environmental requirements.

When continuous welded rail is laid across the bridge, longitudinal forces are generated either by thermal variations in the bridge supports or braking/ traction forces on the bridge itself, and these are partly absorbed via the track and partly by the sub-structure.

These forces must be taken into account and calculated into bridge and bridge-support design.

This leaflet concerns ballasted track on concrete (see Appendix B - page 14) or steel (see Appendix A - page 13) bridges. Cases of ballastless track/slab track are also introduced.

This document should be used in conjunction with the following UIC leaflets (see Bibliography - page 15):

<i>UIC Leaflet 776-1</i>	Loads to be considered in railway bridge design
<i>UIC Leaflet 776-2</i>	Bridges for high and very high speeds
<i>UIC Leaflet 776-3^a</i>	Deformation of bridges
<i>UIC Leaflet 719</i>	Earthworks and trackbed construction for railway lines
<i>UIC Leaflet 774-3</i>	Track - bridge Interaction. Recommendations for calculations

a. Will be suppressed after publication of 776-1 and 776-2 new editions and EN 1991-2 & EN 1990 A1