

Road and Transportation Research Association



Working Group Infrastructure Management

**Guidelines
for the standardisation
of pavement structures of
traffic areas**

RStO 12

R 1

**Edition 2012
Translation 2015**

© 2015 Forschungsgesellschaft für Straßen- und Verkehrswesen e.V., Cologne

This publication may not be reproduced in whole or in part without the prior written permission of the publisher except as permitted by copyright law; neither may the whole nor any part be reproduced, translated, stored in a retrievable electronic system, distributed or transmitted in any form or by any means, including photocopying, recording or other electronic or mechanical methods. Brief quotations may be made in accordance with copyright law with the indication "RStO 2012" given at the point of quotation and the full reference: *"Forschungsgesellschaft für Straßen- und Verkehrswesen e.V., (German Road and Transportation Research Association), 2012. Guidelines for the standardisation of pavement structures of traffic areas, Edition, No. 30/2012, Cologne, Germany"*, given elsewhere in the quoting publication or work.

ISBN 978-3-86446-021-0

Road and Transportation Research Association



Working Group Infrastructure Management

**Guidelines
for the standardisation
of pavement structures of
traffic areas**

RStO 12

R 1

**Edition 2012
Translation 2015**

Working Group Infrastructure Management
Committee: Design
Task group: Revision of RStO

The following people contributed to the revision process:

Chairman:

TRDir. Dipl.-Ing. Ralph Sieber, Bonn

Members:

Univ.-Prof. Dr.-Ing. Hartmut J. Beckedahl, Wuppertal
BDir. Dipl.-Ing. Werner Bednorz, Bonn
Dipl.-Ing. Holger Beyer, Magdeburg
Dipl.-Ing. Klaus Böhme, Leinfelden-Echterdingen
Dipl.-Ing. Gudrun Golkowski, Bergisch Gladbach
MR'in Dipl.-Ing. Angelika Gipper, Bonn
Dipl.-Ing. Rainer Helbig, Hannover
Dipl.-Ing. Petra Helbl, Rostock
Dipl.-Ing. Alexander Kiehne, Dresden
Dipl.-Ing. Heinz-Jürgen Knaak, Kiel
Prof. Dr.-Ing. Carsten Koch, Köln
Dr.-Ing. Bernhard Lechner, Munich
Akad. Dir. Dr.-Ing. Holger Lorenzl, Braunschweig
Dipl.-Ing. Uwe Ludewig, Berlin
Dipl.-Ing. Franz Lütke-Wermeling, Hamm
Dipl.-Phys. Reinhardt Nickol, Halberstadt
Dipl.-Ing. Michael Ohmen, Hamburg
Dipl.-Ing. Thomas Plehm, Hoppegarten
Univ.-Prof. Dr.-Ing. Martin Radenberg, Bochum
BDir. Dipl.-Ing. Gernot Rodehack, Kempten
Dipl.-Ing. (FH) Volker Scheipers, Gelsenkirchen
Dipl.-Ing. (FH) André Täube, Bonn
Dipl.-Ing. Stephan Villaret, Hoppegarten
Univ.-Prof. Dr.-Ing. habil. Frohmut Wellner, Dresden
Dipl.-Ing. Cornelia Wieczorek, Wiesbaden
Univ.-Prof. Dr.-Ing. Ulf Zander, Siegen

Preliminary remark

The "Guidelines for the standardisation of pavement structures of traffic areas", edition 2012 (RStO 12) have been drawn up by the task group "Revision of RStO" in the committee "Design" (Chairman: Univ.-Prof. Dr.-Ing. habil. Wellner). They replace the guidelines of the same name, edition 2001 (RStO 01). The revision of the RStO 01 was necessary due to new findings and, most importantly, to the increase in relevant design traffic load and changes in traffic composition. RStO 12 was drafted with the involvement of representatives from municipal building authorities, the German Ministry of Transport, Construction and Urban Development, and the senior state road authorities.

Table of contents

	Page
1 General	7
2 Basic principles	7
2.1 Terminology	7
2.1.1 Structure	7
2.1.2 Rehabilitation	9
2.1.3 Relevant design traffic load	9
2.1.4 Loading from traffic	9
2.2 Criteria for the thickness design of the pavement structure ..	9
2.3 Drainage	9
2.4 Selection of structures	9
2.4.1 New construction	9
2.4.2 Rehabilitation	10
2.5 Load classes and relevant design traffic load	10
2.5.1 Carriageways	10
2.5.2 Bus traffic areas	11
2.5.3 Maintenance and service areas	11
2.5.4 Parking areas	11
2.5.5 Other traffic areas	11
2.6 Special loading	11
3 Construction of new carriageways	13
3.1 Subsoil and subgrade	13
3.1.1 F2- and F3- soils	13
3.1.2 F1-soils	13
3.2 Minimum thickness of frost resistant pavement structure ..	14
3.2.1 General	14
3.2.2 Initial values for determination of the minimum thickness	14
3.2.3 Additional or reduced thicknesses	14
3.3 Pavement structure	17
3.3.1 Structures and layer thicknesses	17
3.3.2 Base courses	17
3.3.3 Asphalt surface courses	17
3.3.5 Block pavements	18
3.3.6 Special features	18
3.4 Supplementary information for trafficked areas in urban areas	18
4 Rehabilitation of carriageways	22
4.1 Evaluation of the structural health of existing pavements substance	22
4.1.1 Relevant design traffic load and pavement age	22
4.1.2 Determination of surface condition and identification of pavement damage	22
4.1.3 Bearing capacity	22
4.1.4 Type and condition of existing pavements	23
4.1.5 Drainage facilities	23
4.2 Thickness of the frost resistant pavement structure	23
4.3 Rehabilitation methods	23
4.4 Rehabilitation with complete replacement of existing pavements	23

	Page
4.5 Rehabilitation with partial replacement of existing pavements	23
4.6 Rehabilitation on existing pavements	23
4.6.1 General	23
4.6.2 Rehabilitation using asphalt layers	23
4.6.3 Rehabilitation using concrete layers	24
5 New construction and rehabilitation of other traffic areas. ..	25
5.1 Bus traffic areas	25
5.2 Cycle paths and footpaths	25
5.3 Maintenance and service areas	25
5.4 Parking areas	26

Annexes

Annex 1: Determination of the relevant design traffic [B]	28
Method 1 – Determination of B from DTV ^(SV) values	28
Method 2 – Determination of B using axle load data	29
Annex 2: Examples	33
Annex 3: Technical regulations	51

List of figures

	Page
Figure 1: Example pavement in rural areas and in urban areas with water-permeable boundary areas – embankment/side-cut	8
Figure 2: Example pavement in urban areas with partially water-impermeable boundary areas and with drainage facilities	8
Figure 3: Example pavement in urban areas with water-impermeable boundary areas and closed side construction and with drainage facilities	8
Figure 4: Structures on F1-soil with $E_{v2} \geq 120$ MPa (for load class Bk0.3 $E_{v2} \geq 100$ MPa)	13
Figure 5: Structures on F1-soil with stabilization according to ZTV Beton-StB	13
Figure 6: Frost action zones.	16

List of tables

Table 1: Relevant design traffic and assigned load class	10
Table 2: Possible load classes for typical design situations according to RASSt	11
Table 3: Design traffic load on bus traffic areas and load classes	11
Table 4: Traffic areas in maintenance and service areas and load classes	11
Table 5: Parking areas and load classes	11
Table 6: Initial values for determination of the minimum thickness of the frost resistant pavement structure	14
Table 7: Additional or reduced thicknesses due to local conditions	15
Table 8: Reference values for layer thicknesses required for bearing capacity reasons for unbound granular layers (UGL) according to ZTV SoB-StB depending on the E_{v2} -values of the base and the base course type	17

List of plates

Plate 1: Structures with asphalt surface course for carriageways on F2- and F3-subsoil/subgrade	19
Plate 2: Structures with concrete surface course for carriageways on F2- and F3-subsoil/subgrade	20
Plate 3: Structures with block pavements for carriageways on F2- and F3-subsoil/subgrade	21
Plate 4: Structures with fully bound pavement structure for carriageways on F2- and F3-subsoil/subgrade	22
Plate 5: Rehabilitation using asphalt layers on existing pavements	24
Plate 6: Structures for cycle paths and footpaths on F2- and F3-subsoil/subgrade	25

Remarks on the system of technical publications of the FGSV

R stands for regulations:

These publications either specify the technical design or realization (R1) or give recommendations on the technical design or realization (R2).

W stands for information documents:

These publications represent the current state-of-the-art knowledge and define how a technical issue shall be practicably dealt with or has already been successfully dealt with.

Category R1 indicates 1st category regulations:

R1-publications contain the contractual basis (Additional Technical Conditions of Contract and Directives, Technical Conditions of Delivery and Technical Test Specifications) as well as guidelines. They are always coordinated within the FGSV. R1-publications – in particular if agreed on as integral part of the contract – have a high binding force.

Category R2 indicates 2nd category regulations:

R2-publications contain information sheets and recommendations. They are always coordinated within the FGSV. Their application as state-of-the-art technology is recommended by the FGSV.

Category W1 indicates 1st category documents of knowledge:

W1-publications contain references. They are always coordinated within the FGSV but not with external parties. They represent current state-of-the-art knowledge within the respective responsible boards of the FGSV.

Category W2 indicates 2nd category documents of knowledge:

W2-publications contain working papers. These may include preliminary results, supplementary information and guidance. They are not coordinated within the FGSV and represent the conception of an individual board of the FGSV.

Published by:

FGSV Verlag GmbH

D-50999 Cologne/Germany · Wesselinger Straße 17
Phone: 0 22 36 / 38 46 30 · Fax: 0 22 36 / 38 46 40
E-Mail: info@fgsv-verlag.de · Internet: www.fgsv-verlag.de



R 1