

**Additional technical conditions of contract
and directives for the construction
of base courses with hydraulic binders
and concrete pavements**

R 1

ZTV Beton-StB 07

**Edition 2007
Translation 2012**

© 2012 Forschungsgesellschaft für Straßen- und Verkehrswesen e.V., Köln
(Road and Transportation Research Association, Cologne/Germany)

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission in writing from the Road and Transportation Research Association, Cologne/Germany.

**Additional technical conditions of contract
and directives for the construction
of base courses with hydraulic binders
and concrete pavements**

ZTV Beton-StB 07



R1

Working Group Concrete Pavements
Committee: Technical Conditions of Contract
Task Group: ZTV/TL/TP Beton

Chairman: Prof. Dr.-Ing. E g e r, München

Members: BAFr Dipl.-Ing. B i l g e s h a u s e n, Bonn
Dipl.-Ing. B ö h m e, Düsseldorf
Dipl.-Ing. (FH) B u s c h, Bonn
Dr.-Ing. E h r l i c h, Düsseldorf
Dipl.-Ing. E i c k s c h e n, Düsseldorf
Dr.-Ing. E i f e r t, Düsseldorf
Dipl.-Ing. (FH) F r a n k e, Barsinghausen
Ltd. BDir. a.D. Dipl.-Ing. G r ü n i n g, München †
Dr.-Ing. K e r n, Iffezheim
Dipl.-Ing. N o s k e, Bergisch Gladbach
Dipl.-Ing. R i t t e r, Köln
BDir. Dipl.-Ing. R o d e h a c k, München
Dipl.-Ing. S c h ö n h o f e r, München

Preliminary remark

The “Additional technical conditions of contract and directives for the construction of base courses with hydraulic binders and concrete pavements”, issue 2007 (ZTV Beton-StB 07) were compiled by the task group “ZTV/TL/TP Beton” in the committee “Technical conditions of contract” (chairman: Prof. Dr.-Ing. E g e r).

In combination with the “Technical delivery terms for materials and material mixtures for base courses with hydraulic binders and concrete pavements” (TL Beton-StB 07) and the “Technical testing regulations for base courses with hydraulic binders and concrete pavements” (TP Beton-StB 07) this issue replaces the “Additional technical conditions of contract and directives for the construction of concrete pavements” (ZTV Beton-StB 01) as well as the parts of the “Additional technical conditions of contract and directives for base courses in road construction” (ZTV T-StB 95/02) which contain regulations for base courses with hydraulic binders (Section 3 of ZTV T-StB).

Table of Contents

	page
1 General	9
1.1 Scope	9
1.2 Definitions	10
1.3 General regulations	13
1.3.1 Limiting values and tolerances	13
1.3.2 Tests	13
1.3.2.1 General	13
1.3.2.2 Self-monitoring tests	13
1.3.2.3 Control tests	14
1.3.2.4 Additional control tests	14
1.3.2.5 Arbitration tests	15
1.3.2.6 Test methods	15
1.3.2.6.1 General	15
1.3.2.6.2 Thickness of installed layers	15
1.3.2.6.3 True-to-profile position	16
1.3.2.6.4 Evenness	16
1.3.2.6.5 Skid resistance	16
1.3.3 Construction principles	16
1.3.3.1 Superstructure for trafficked areas	16
1.3.3.2 Subgrade	17
1.3.3.3 Edge design	18
2 Base courses with hydraulic binders	20
2.1 General regulations for base courses	20
2.1.1 Building materials, building material mixtures and mixtures for placement	20
2.1.2 Placement conditions	20
2.1.3 Notches	21
2.1.3.1 Notches beneath concrete pavement	21
2.1.3.2 Notches beneath asphalt layers	21
2.1.4 Curing	22
2.1.4.1 Wet curing	22
2.1.4.2 Spraying with bitumen emulsion	22
2.1.4.3 Spraying with bitumen emulsion and gritting with crushed aggregates	23
2.1.4.4 Application of water-retaining cover	23
2.1.5 Protecting base courses	23
2.1.6 Requirements	23

	Page
2.2 Stabilized layers	23
2.2.1 Building materials, building material mixtures and mixtures for placement	23
2.2.2 Construction principles	23
2.2.3 Execution	24
2.2.3.1 Production of stabilized layers	24
2.2.3.1.1 Mix-in-place process	24
2.2.3.1.2 Mix-in-plant process	25
2.2.4 Binder quantity	25
2.2.5 Type and scope of tests	25
2.2.5.1 Self-monitoring tests	25
2.2.5.2 Control tests	25
2.3 Hydraulically bound base course	25
2.3.1 Construction principles	25
2.3.2 Execution	26
2.3.3 Type and scope of tests	26
2.3.3.1 Self-monitoring tests	26
2.3.3.2 Control tests	26
2.4 Concrete base courses	26
2.4.1 Construction principles	26
2.4.2 Execution	26
2.4.3 Type and scope of tests	27
2.4.3.1 Self-monitoring tests	27
2.4.3.2 Control tests	27
3 Concrete pavement	27
3.1 Construction principles	27
3.1.1 Subgrade	27
3.1.2 Intermediate layer of non-woven fabrics	28
3.1.3 Thickness of concrete pavements	28
3.1.4 Joints	28
3.1.4.1 Joint positions	29
3.1.4.2 Dowels and anchors	30
3.1.5 Reinforcing steel	33
3.1.6 End regions	33
3.1.7 Acceleration and exit lanes	36
3.1.8 Concrete pavements on bridges	36
3.1.9 Concrete pavements in tunnels and trough structures	43

	Page
3.2 Building materials, concrete	46
3.3 Execution	47
3.3.1 Production of concrete pavement	47
3.3.1.1 Transporting concrete	47
3.3.1.2 Formwork and guidance of construction equipment	48
3.3.1.3 Placing of dowels and anchors	48
3.3.1.4 Placing concrete and steel inserts	49
3.3.1.5 Compacting concrete	50
3.3.1.6 Surface finishing	50
3.3.1.6.1 Removing surface mortar	51
3.3.1.6.2 Finishing in transverse direction using a steel broom	51
3.3.1.6.3 Screeding using artificial grass	52
3.3.1.7 Concreting at low temperatures	52
3.3.1.8 Concreting at high temperatures	52
3.3.2 Notching of joints	53
3.3.2.1 Dummy joints	53
3.3.2.2 Expansion joints	54
3.3.2.3 Construction joints	54
3.3.3 Protective measures and curing	54
3.3.3.1 Protective measures	55
3.3.3.2 Curing	55
3.3.3.2.1 Wet curing	55
3.3.3.2.2 Application of curing agents	55
3.3.3.2.3 Sheeting as cover	56
3.3.3.2.4 Applying water-retaining covers	56
3.3.4 Requirements for concrete pavement	57
3.3.4.1 Concrete strength	57
3.3.4.2 Air void content of fresh concrete	57
3.3.4.3 Pavement thickness	57
3.3.4.4 Position of dowels	58
3.3.4.5 True-to-profile position	58
3.3.4.6 Evenness	58
3.3.4.7 Skid resistance	58
3.3.5 Opening for traffic	59
3.4 Special rules for concrete pavement with superplasticizer	60
3.4.1 Application	60

	Page
Annex	67
Annex A: Requirements for base courses with hydraulic binders	68
Annex B: Requirements for concrete pavement	70
Annex C: Tests on building materials and finished stabilization work . .	71
Annex D: Tests on building materials and finished work for hydraulically bound base courses	72
Annex E: Tests on building materials and finished work for concrete base courses.	73
Annex F: Tests on building materials, concrete and finished work for concrete pavement	74
Annex G: Annex to the individual contractual agreement on deductions in the event of excess or shortfall of the limiting values according to ZTV Beton-StB	77
Annex H: General technical specifications in construction contracts (ATV) DIN 18299, general rules applying to all types of construction work, Edition 2006.	84
Annex I: General technical specifications in construction contracts (ATV) road construction – surfacings with hydraulic binders DIN 18316, Edition 2006	90
Annex J: Abbreviations and technical regulations.	101

List of illustrations

Figure 1: Example of concrete pavement structure outside built-up areas in classified road construction – embankment/cut	10
Figure 2: Example of asphalt pavement structure outside built-up areas in classified road construction – embankment/cut	11
Figure 3: Edge design of concrete pavement on base course with hydraulic binder	18
Figure 4: Edge design of concrete pavement on unbound crushed stone base course (STSuB)	18
Figure 5: Edge design of concrete pavement on asphalt base course .	19
Figure 6: Edge design of asphalt pavement on base course with hydraulic binder	19
Figure 7: Edge design of asphalt pavement on stabilized base course with hydraulic binder	19
Figure 8: Joint and marking layout in cross section with example for distribution of dowels	31

	Page
Figure 9: Details of marking along central longitudinal joint (left) and longitudinal joint to the hard shoulder (right) according to RMS 2	32
Figure 10: Example of end slab with increased thickness	34
Figure 11: Example of end slab with end spur	34
Figure 12: End spur in detail	35
Figure 13: Concrete pavement on bridge deck – cross section	37
Figure 14: Concrete pavement on bridge without transition structure in the case of base course with hydraulic binder – longitudinal section	38
Figure 15: Design detail of base course with hydraulic binder – transition from the main section of the road to the bridge area	39
Figure 16: Concrete pavement on bridge without transition structure in the case of crushed stone base course – longitudinal section	40
Figure 17: Design detail of pavement structures with crushed stone base – transition from main section of road to bridge area – left: standard case, right: exceptional case with reduced thickness	41
Figure 18: Joint layout for concrete pavement on bridges	42
Figure 19: Possible joint layout in the transition region of concrete pavement from the connecting section of road to a bridge without transition structure for abutment at an angle – plan view	43
Figure 20: Standard design – concrete pavement in tunnel/trough structure with the same pavement as the connecting section of road – cross section	45
Figure 21: Special design – concrete pavement in tunnel/trough structure supported directly by the blinding or structural concrete/tunnel invert – cross section	46

List of tables

Table 1: Temperature limits for concreting	53
Table 2: Minimum air void content of fresh concrete	57
Table 3: Requirements for air void parameters in hardened concrete	57

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 Guidelines, 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



R1