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English Version

Design of fastenings for use in concrete - Part 4-3: Anchor channels

Conception-calcul des éléments de fixation pour béton -
Partie 4-3 : Rails d'ancrage

Bemessung von Befestigungen in Beton - Teil 4-3:
Ankerschienen

This Technical Specification (CEN/TS) was approved by CEN on 20 October 2008 for provisional application.

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Contents

Page

Foreword.....	3
1 Scope	4
1.1 General.....	4
1.4 Anchor channel loading.....	4
1.4.3 Actions not covered	4
2 Normative references	4
3 Definitions and symbols	5
4 Basis of design	5
5 Determination of action effects	5
5.2 Derivation of forces acting on anchor channels	5
5.2.1 General.....	5
5.2.2 Tension loads.....	6
5.2.3 Shear loads.....	7
5.3 Tension forces in a supplementary reinforcement	8
5.3.3 Tension loads.....	8
5.3.4 Shear loads.....	8
6 Verification of ultimate limit state by elastic analysis	9
6.1 General.....	9
6.2 Tension loads.....	9
6.2.1 Required verifications	9
6.2.2 Design of supplementary reinforcement.....	9
6.2.3 Steel failure.....	11
6.2.4 Pullout failure	11
6.2.5 Concrete cone failure	12
6.2.6 Splitting failure.....	16
6.2.7 Blow-out failure.....	17
6.2.8 Steel failure of the supplementary reinforcement.....	18
6.2.9 Anchorage failure of the supplementary reinforcement in the concrete cone	19
6.3 Shear loads.....	19
6.3.1 Required verifications	19
6.3.2 Design of reinforcement	19
6.3.3 Steel failure.....	21
6.3.4 Concrete pry-out failure	22
6.3.5 Concrete edge failure	22
6.3.6 Steel failure of supplementary reinforcement	26
6.3.7 Anchorage failure of supplementary reinforcement in the concrete cone.....	26
6.4 Combined tension and shear loads	27
6.4.1 Anchor channels without supplementary reinforcement.....	27
6.4.2 Anchor channels with supplementary reinforcement.....	27
7 Fatigue	28
8 Seismic	28

Foreword

This Technical Specification (CEN/TS 1992-4-3:2009) has been prepared by Technical Committee CEN/TC 250 "Structural Eurocodes", the secretariat of which is held by BSI.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This Technical Specification CEN/TS 1992-4-3 — Anchor Channels, describes the principles and requirements for safety, serviceability and durability of anchor channels for use in concrete, together with specific provisions for structures serving as base material. It is based on the limit state concept used in conjunction with a partial factor method.

This Technical Specification does not provide information about the use of National Determined Parameters (NDP).

CEN/TS 1992-4 'Design of fastenings for use in concrete' is subdivided into the following parts:

- *Part 1: General*
- *Part 2: Headed fasteners*
- *Part 3: Anchor channels*
- *Part 4: Post-installed fasteners — Mechanical systems*
- *Part 5: Post-installed fasteners — Chemical systems*

Relation to CEN/TS 1992-4-1

The principles and requirements of Part 3 of this CEN/TS are additional to those in CEN/TS 1992-4-1, all the clauses and sub-clauses of which also apply to Part 3 unless varied in this Part. Additional information is presented under the relevant clauses/sub-clauses of CEN/TS 1992-4-1. The numbers for the clauses/sub-clauses of Part 3 continue from the number of the last relevant clauses/sub-clauses of Part 1.

The above principles also apply to Figures and Tables in Part 3.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

1.1 General

1.1.6 This document relies on characteristic resistances and distances which are stated in a European Technical Specification. In minimum the following characteristics should be given in a European Technical Specification as base for the design methods of this CEN/TS.

- $N_{Rk,s,a}$, $N_{Rk,s,c}$, $N_{Rk,s,l}$, $N_{Rk,s,s}$, $V_{Rk,s,s}$, $V_{Rk,s,l}$, $M_{Rk,s,flex}$, $M_{Rk,s}^0$
- $N_{Rk,p}$
- α_{ch} , α_p
- $c_{cr,N}$, $s_{cr,N}$
- $c_{cr,sp}$, $s_{cr,sp}$
- c_{min} , s_{min} , h_{min}
- limitations on concrete strength classes of base material
- k_5
- A_h , b_{ch} , d , h_{ef} , h_{ch} , I_y
- γ_{Mi} partial factors for material see also CEN/TS 1992-4-1:2009, clause 4

1.4 Anchor channel loading

1.4.3 Actions not covered

The following actions are not covered by this CEN/TC:

- shear in the direction of the longitudinal axis of the channel;
- fatigue loading;
- seismic loading.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE The following references to Eurocodes are references to European Standards and European Prestandards. These are the only European documents available at the time of publication of this TS. National documents take precedence until Eurocodes are published as European Standards.

EN 1992-1-1, *Design of concrete structures — Part 1-1: General rules and rules for buildings*

CEN/TS 1992-4-1:2009, *Design of fastenings for use in concrete — Part 4-1: General*

3 Definitions and symbols

The definitions and symbols are given in CEN/TS 1992-4-1.

4 Basis of design

4.5.4 The following assumptions in respect to installation have been made in this CEN/TS. The installation instructions should reflect them:

- 1) The anchor channel should be fixed to the formwork or auxiliary constructions in a way that no movement of the anchor channel will occur during placing of reinforcement or during pouring and compacting of the concrete.
- 2) Requirements for adequate compaction particularly under the head of the anchor and under the channel.
- 3) Requirements for inspection and approval of the correct installation of the anchor channels by appropriately qualified personnel.
- 4) Placing anchor channels by only pushing them into the wet concrete is not allowed.
- 5) It is accepted to vibrate the anchor channels into the wet concrete immediately after pouring under the following conditions:
 - The size and number of fastenings is limited to anchor channels with a length of <1 m if placed by 1 person, so that it can be placed simultaneously during vibrating by the available personnel. Longer channels should be placed by at least 2 persons.
 - The installation is carried out according to a quality system.
 - The anchor channels are not moved after vibrating has been finished.
 - The concrete in the region of the anchor and the anchor channel is properly compacted.

5 Determination of action effects

5.2 Derivation of forces acting on anchor channels

5.2.1 General

5.2.1.6 The distribution of tension loads acting on the channel to the anchors may be calculated using a beam on elastic support (anchors) with a partial restraint of the channel ends as statical system. The resulting anchor forces depend significantly on the assumed anchor stiffness and degree of restraint. For shear loads the load distribution is also influenced by the pressure distribution in the contact zone between channel and concrete.

5.2.1.7 As a simplification for anchor channels with two anchors the loads on the anchors may be calculated assuming a simply supported beam with a span length equal to the anchor spacing.

5.2.1.8 For anchor channels with more than two anchors as an alternative in the following the triangular load distribution method to calculate the distribution of tension and shear loads to the anchors is introduced.

5.2.1.9 In the case of shear loads, this CEN/TS covers only shear loads acting on the channel perpendicular to its longitudinal axis.