

TECHNICAL REPORT

CEN/TR 17081

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

September 2018

ICS 21.060.01; 91.080.40

English Version

Design of fastenings for use in concrete - Plastic design of fastenings with headed and post-installed fasteners

Bemessung der Verankerung von Befestigungen in
Beton - Traglastverfahren für Befestigungsmittel von
Kopfbolzen und Dübel

This Technical Report was approved by CEN on 9 April 2017. It has been drawn up by the Technical Committee CEN/TC 250.

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (CEN/TR 17081:2018) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, the secretariat of which is held by BSI.

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Introduction

It is intended that this document is used in conjunction with EN 1992-4.

The numerical values for reliability parameters are recommended values and may be changed in a National Annex, if required. The recommended values apply when the installation complies with the requirements of EN 1992-4:2018, 4.6.

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1 Scope

This Technical Report gives provisions for design of ultimate limit states in addition to EN 1992-4 for headed and post-installed fasteners excluding concrete screws, which only transmit static actions to the concrete, when the loads on individual fasteners are determined according to plastic analysis of the joint where only equilibrium conditions but no compatibility conditions are considered. Fatigue, impact and seismic loads are not covered.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1992-1-1:2004, *Eurocode 2: Design of concrete structures — Part 1-1: General rules and rules for buildings*¹⁾

EN 1992-4:2018, *Eurocode 2 — Design of concrete structures — Part 4: Design of fastenings for use in concrete*

EN 1993-1-8:2005, *Eurocode 3: Design of steel structures — Part 1-8: Design of joints*²⁾

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions and symbols given in EN 1992-4:2018 and the following symbols apply.

f_{cd} design value of concrete compressive strength;

F_{Rdu} concentrated design resistance for concrete.

4 Field of application

4.1 General

Significant redistribution of forces in individual fasteners of fastenings is implicit in plastic analysis. Therefore, this analysis is acceptable only when the failure is governed by ductile steel failure of the fastening under tension, shear or combined tension and shear loads. The behaviour of the base plate might be elastic or plastic (see EN 1993-1-8). The analysis should be used for ultimate limit state only. This document applies only to fastenings subjected to axial and/or shear forces with bending moment in one direction (see Figure 1).

4.2 Conditions for ductile behaviour

To ensure a ductile steel failure, the following conditions shall be met:

1) This standard is impacted by the amendment EN 1992-1-1:2004/A1:2014 and corrigenda EN 1992-1-1:2004/AC:2008 and EN 1992-1-1:2004/AC:2010.

2) This standard is impacted by the corrigenda EN 1993-1-8:2005+AC:2005 and EN 1993-1-8:2005+AC:2009.