

# User's manual - Concrete Anchors

## Disclaimer e Responsibility for use

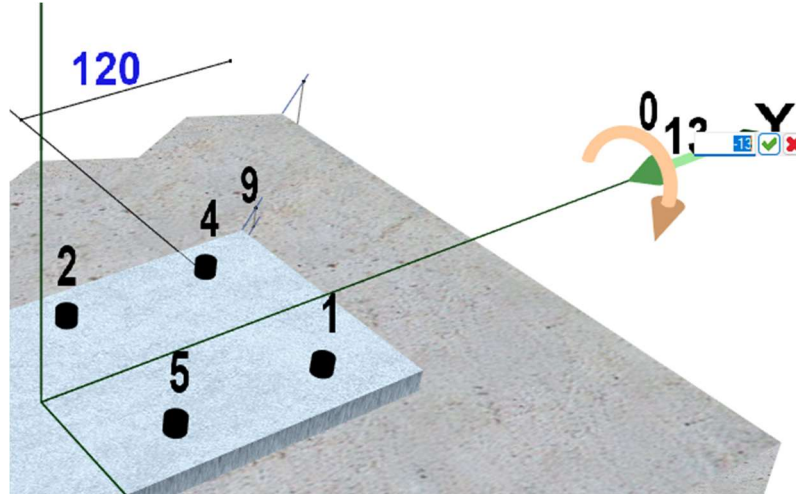
The downloaded files are intended to be design support instruments, which can be personalized depending on the project requirements.

- It is your sole responsibility to ensure that the actions used in the anchor calculation are design actions in accordance with national design codes.
- The calculation program is based on ultimate limit state loads. The loads entered must be design loads; therefore, design values must be entered to which partial safety coefficients have been applied for the actions, in accordance with national regulations.
- The dimensioning and verification of timber and concrete elements must be carried out separately.
- For the calculation of anchors with reduced centre distances, close to the edge or for fixing on concrete of a higher strength class or of reduced thickness or with dense reinforcement, please refer to the reference ETA document.
- For the design of anchors subjected to seismic loading, please refer to the reference ETA document and to the provisions of EN 1992-4:2018.

## Guide

1. Object to be fixed: *(the software provides the sole concrete anchor side resistance, while the fixing to the secondary element has to be calculated aside). The secondary timber element's verification and its connection will **always have to be done aside**, with Myproject software.*
2. Fixing plate: The template can be downloaded from its relative website page and subsequently uploaded on the software to be then adapted depending on own needs.
3. Concrete: choose concrete resistance class and cracking condition (cracked or NOT cracked).
4. Design Standard: The program provides the choice between ETAG or EN 1992-4 standards. The calculation standard to refer to depends on the product selected.
  1. ETAG: This design method is based on the EOTA guideline and the technical report on the design of concrete anchors. EOTA ETAG 001, Annex C "Metal anchors for use in concrete: design methods for anchors", EOTA TR 029 "Design of chemical anchors",
  2. Recommended: EN 1992-4:2018. Eurocode 2. "Design of concrete structures. Part 4: Design of anchors for use in concrete". The coefficient of the effect of the sustained load  $\alpha_{s,sus} = 0.6$  is recommended.

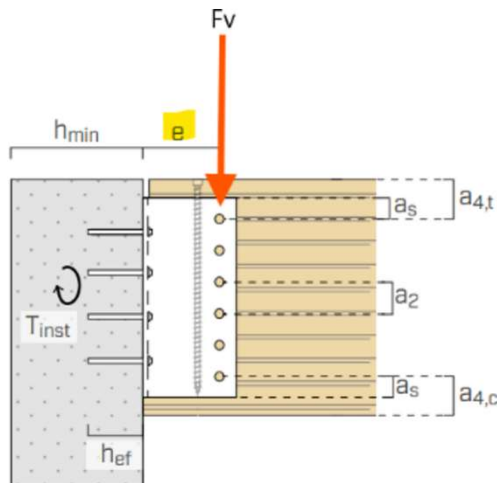
5. Stresses: The inserted loads shall be design loads and not characteristic, to which partial safety coefficients have been applied for actions, in accordance with national regulations. The design loads can also be entered directly into the graphic screen by clicking on the corresponding value, for any direction of the stress:  $F_v$ ,  $F_{ax}$ ,  $F_{lat}$ .



In the case of combined loads (traction, shear, flexion and torsion), it is possible to choose the option "load combinations". Particular attention should be paid on the plate orientation in order to apply loads in the correct direction.

Fundamental is to consider the **eccentricity generated rotating moment** due to the distance between dowels and concrete surface (**e**). Such eccentricity is due to connection's geometry, particularly because of fixings' position on the secondary element (see example below of an ALUMIDI).

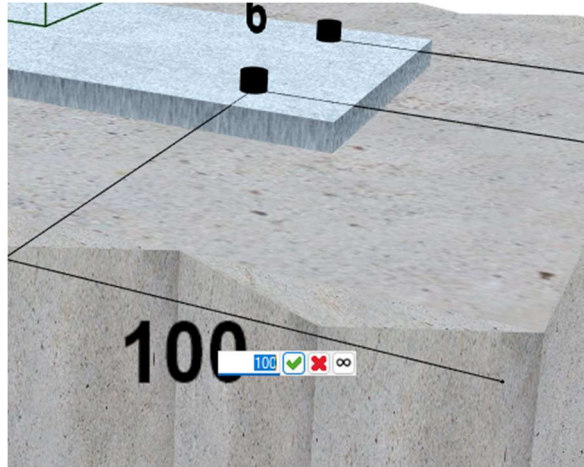
The formula to be adopted is  $M = F_v \cdot e$ .



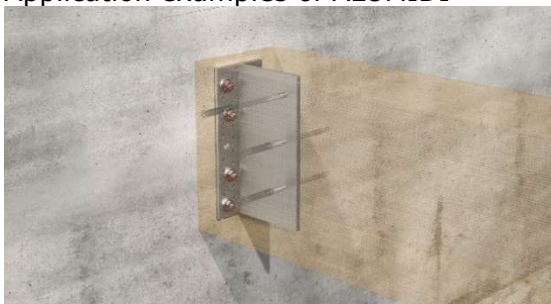
secondary beam-timber		self-drilling dowel	smooth dowel
		SBD Ø7,5	STA Ø12
dowel-dowel	$a_2$ [mm]	$\geq 3 \cdot d$	$\geq 36$
dowel-top of beam	$a_{4,t}$ [mm]	$\geq 4 \cdot d$	$\geq 48$
dowel-bottom of beam	$a_{4,c}$ [mm]	$\geq 3 \cdot d$	$\geq 36$
dowel-bracket edge	$a_s$ [mm]	$\geq 1,2 \cdot d_0^{(1)}$	$\geq 16$
dowel-main beam	$e$ [mm]	-	-

(1) Hole diameter.

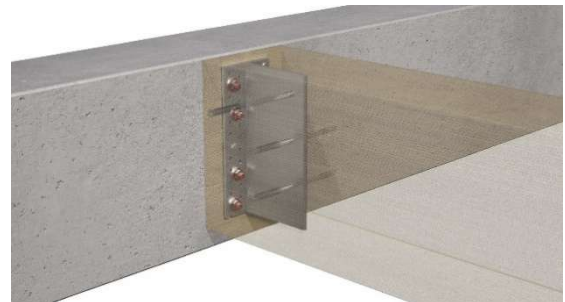
6. Minimum distances: The preset values must be modified according to the minimum distances of the object to be fixed from the edges and ends of the concrete wall/beam/column as the software will only propose the anchors that meet this requirement.



Application examples of ALUMIDI



Application with infinite minimum distances



Application with defined minimum distances

7. Design options: The design can be carried out in static, seismic and fire modes. The seismic design module of the program has been developed in accordance with EOTA TR045 and prEN1992-4 while the fire design is performed in accordance with EOTA TR020 and prEN1992-4.

The program will then return the validated solutions according to the suitable anchors and certified for each specific case depending on the input data entered.

## Results

When the program performs the calculation, it returns the results divided into three categories: "Valid Anchors", "Unsuitable Anchors" and "Incompatible". The program returns valid anchors first, with the possibility of still seeing rejected and unsuitable anchors.