



EDL - punching shear reinforcement

Slabs in slab-and-column structures are usually two-way reinforced, which allows the transfer bending moments that occur in two perpendicular directions. In the area of supports of the slab, large support reactions occur, which, combined with moments, cause a complex state of stress that can lead to punching the slab. The phenomenon of punching a flat reinforced concrete slab can often be a factor determining the thickness of the slab.

The slab punching phenomenon is tearing out the cone-shaped part within the applied vertical force. During punching the slab, the upper reinforcement of the slab is torn out and the perforation in the vicinity of the support occurs. It is known from many years of experience that the phenomenon of punching the plate is particularly dangerous due to the lack of scratches and earlier signs of impending damage. Additionally, the occurrence of a slab punching within one column may lead to an increase in the forces at the next column and ultimately lead to a construction disaster.

Slabs without vertical reinforcement have a relatively low punching resistance. order to increase you can use o-headed anchors, which additionally increases the ductility of the slab. The EDL punching shear reinforcement can also be used in foundation slabs on the same terms as in floor slabs.

The EDL punching shear reinforcement is in the form of steel anchors with forged heads on both sides.

Additionally, EDL elements are connected in sets by means of connecting bars, which allow to maintain appropriate distances between anchors.

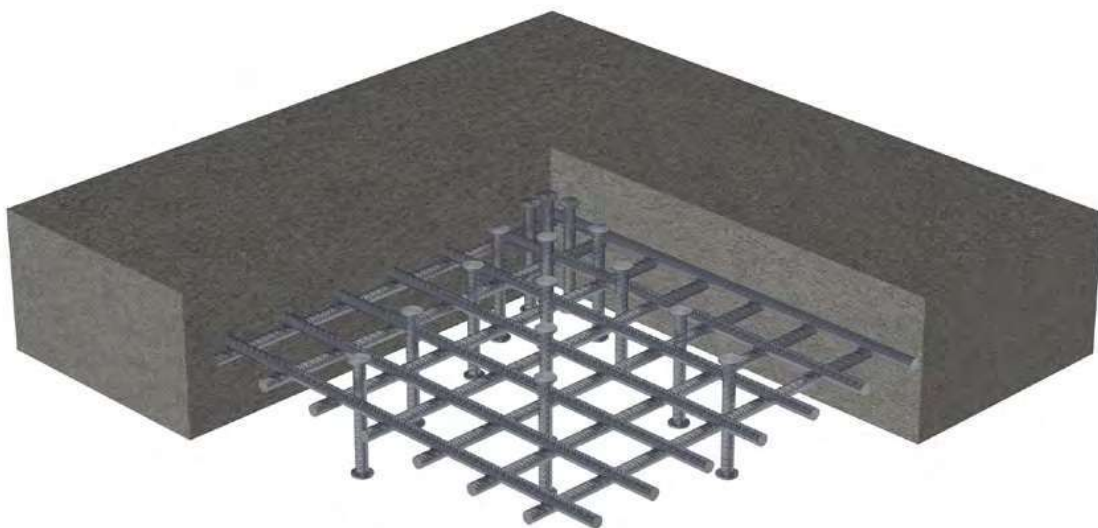
The basic principles of dimensioning the punching shear reinforcement were defined after the introduction of harmonized European standards in the PN-EN 1992-1-1:2008 standard. Detailed information and the procedure for dimensioning the punching shear reinforcement are included in the Technical Approval of the EDL product issued by the Building Research Institute (Instytut Techniki Budowlanej) in Warsaw.



The element with 2 anchors



The element with 3 anchors



EDL - The characteristics of the punching shear reinforcement

Properties and benefits

- ➔ The Technical Approval of ITB
- ➔ The concrete class from C20/25 to C50/60.
- ➔ All strength parameters comply with Eurocode 2.
- ➔ Fast, reliable and simple calculations thanks to the EDL soft-ware.
- ➔ 100% certainty of load transfer through the EDL reinforcement.
- ➔ Significant increase in the punching resistance of ceilings and foundations at the point where the anchors are used.
- ➔ Can be used in ceilings with a thickness from 18 cm.
- ➔ The possibility of making the ceiling without thickening within the column.
- ➔ The increased load capacity in relation to the traditional punching shear reinforcement (stirrups).
- ➔ The reduced slab thickness.
- ➔ Less complicated formworks, the less quantity of concrete and the reinforcement.
- ➔ The easy and quick assembly of the reinforcement, no collision with the other reinforcement, the shorter construction time.
- ➔ Can be installed before or after laying the main reinforcement of the slab (from top or bottom).
- ➔ Can be used in prefabricated elements, filigran ceilings.
- ➔ Thanks to the use of spacers and mounting bars, the size of the concrete cover can be easily controlled.



Technical information

The EDL punching shear reinforcement is delivered and made according to the order and designer's requirements. The EDL offers anchors with a diameter from 10 mm to 34 mm. The diameter of the anchor head is always three times the diameter of the anchor, which ensures a secure connection between the pressure zone and the spread zone.

The anchor diameter d_1 mm	The anchor head diameter d_1 mm	The min. anchor head thickness h_1 mm	The anchor section A mm ²	The design load capacity F _{rd} kN
10	30	5	79	34.1
12	36	6	113	49.2
14	42	7	154	66.9
16	48	7	201	87.4
18	54	8	254	106.7
20	60	9	314	131.8
25	75	12	491	213.4
32	96	18	804	379.7
34	102	18	908	381.4

EDL - Assembly instructions for monolithic slabs

General informations

Punching shear reinforcement bars can be installed from above or from below. It is necessary to ensure proper anchoring and covering of anchor heads.

The "from above" assembly

The EDL strip should be placed on the previously made slab reinforcement. In this case, anchors are welded to two rebars.



The "from below" assembly

The EDL bar with welded transverse bars should be placed on standard spacers and fixed with binding wire to obtain the appropriate concrete cover and stabilization of the installed bar.

Assembly instructions

- ➔ Rebars should be built in according to the ceiling reinforcement design.
- ➔ In order to facilitate the assembly, in asymmetrical elements, the end of the bar adjacent to the column may be marked in red.
- ➔ The end of the bar should touch the edge of the column, at the same time forcing the appropriate distance between the first anchor and the column face. If the reinforcement is made of several sections, it is necessary to ensure that the individual bars touch each other.
- ➔ Before installation, it is essential to check the diameter, spacing and length of anchors, and compare these values with those provided in the reinforcement design of the slab.
- ➔ Dowel heads must reach the upper and lower edges of the slab bending reinforcement, respectively.



Technical specification

The EDL punching shear reinforcement, in accordance with technical approval of ITB, can be used to supplement the areas of flat ceilings that are exposed to punching.

The following parameters characterizing the punching shear reinforcement should be defined by the designer:

- ➔ The number of dowels
- ➔ The dowel height
- ➔ The bar length
- ➔ The dowel spacing
- ➔ The number of bars

The order form

EDL - Anchor diameter / Height - Number of anchors - Bar length - Anchor spacings

e.g. EDL - 12/215-3-480-80-160-160-80

Documents

The technical data of the product is available on our website and includes all important data regarding the load capacity, materials, dimensions and installation. This information can be downloaded in the form of the product catalogue or the data sheet. The website also includes a link to the calculation software and the current Technical Approval of ITB.

EDL - The inquiry

Data

Please send your inquiries by e-mail or fax, providing the following details:

- ➔ The ordering party
- ➔ The address or company data
- ➔ The representative
- ➔ The contact phone
- ➔ The object for which the reinforcement is to be valued.

Inquiries can also be submitted via the website.

