UDC 693.2

SPECIFICATION OF CALCULATION OF THE JAMMING SUPPORT TO CONSOLE BEAM IN BRICK LAYING

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One of the most widespread structures of plant and civil buildings is console beams. Beams are made of steel concrete or constructional steel. In civil buildings a console beam is the bearing design of balconies, peaks and other elements. In plant buildings a console beam is the bearing designs of cranes of small capacity, supports of various communications such as cables and pipelines. Console beams are often fixed in brick walls of . It is often observed in old buildings though it is also applied in modern structures.

Jamming support calculation in the design of new buildings and structures or assessing the bearing capacity of existing ones is made without taking into account local stresses and deformations near the contact surfaces of the beam-wall. Meanwhile, the difference in strength and deformation characteristics of a reinforced concrete and steel beam is essential. Vertical movements and rotations of the support section occur due to local deformations of the compression of the brickwork. This phenomenon should be taken into account in the design of new buildings and is especially relevant at the present time when examining existing facilities to determine the bearing capacity and the necessity or non-necessity of reinforcement in case of further reconstruction. Due to the above reasons, your attention is invited to report on the research results on this issue.

The existing method of calculating the depth of seal of a console beam is based on the uniform distribution of contact stresses on the contact surfaces (Fig. 1)

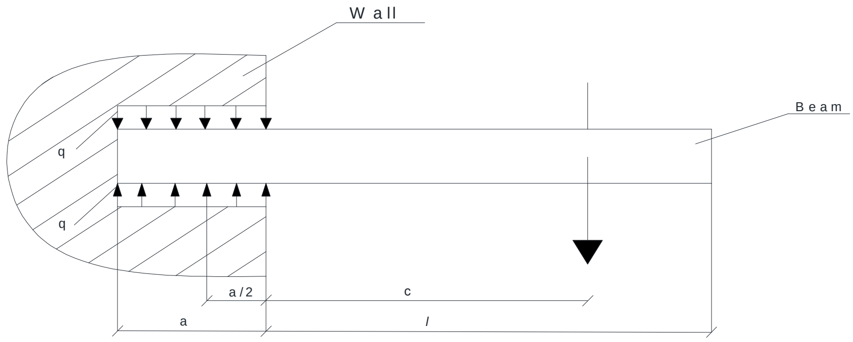
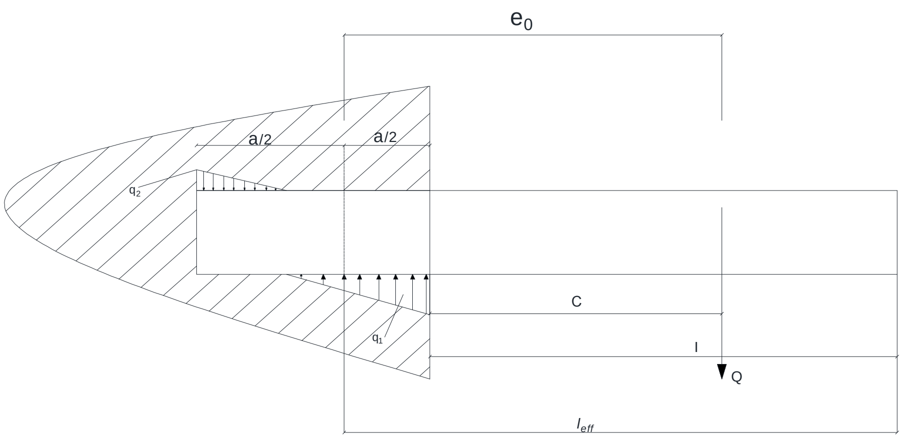


Fig. 1. Uniform distribution of contact tension in the jamming support

As follows from Fig. 1, in case of uniform distribution of contact tension the bricklaying is under conditions of central compression. However, the study of the supports jamming them indicates the presence of local movements (angles of rotation) due to deformations of the bricklaying , which leaвы to redistribution of contact tension which is offered to be distributed under the linear law (Fig. 2).



Pic 2. The specified distribution of contact tension

Calculation on local compression of a laying in a zone of seal of consoles is made on the transformed formula for determination of tension at the non-central compression:

$$Q \le \frac{R_c \cdot ab}{\frac{6e_0}{a} + 1}, \qquad (1)$$

where Q – settlement loading from the beam weight and loadings attached to it;

R_c – settlement crumpling resistance;

$e_0 = \frac{M}{Q}$, where <M> – the moment in seal concerning the seal center;

a and b – respectively seal depth and the width of beam shelves.

The scheme of efforts in seal is provided (Fig. 2).

As follows from Fig. 2.

$$l_{eff} = l + \frac{a}{2}, \text{ a } e_0 = c + \frac{a}{2}.$$

Size <C> for the majority of balconies changes in limits $(0,2 \div 0,5) l_{eff}$.

Size l_{eff} according to the National standard of Belarus and Eurokod lies in limits l and $l + \frac{a}{2}$.

At the same time from evenly distributed loading <q> size $e_0 = 0,5 l_{eff}$ is accepted by a constant and it is entered into a formula (2), received from formula (1):

$$a = \frac{Q}{2R_c b} \sqrt{\frac{Q^2}{4{R_c}^2 b^2} + \frac{6Qe_0}{R_c b}}. \qquad (2)$$

As the test equation when determining depth of seal expression can serve:

$$0,5 l_{eff} = (0,2 \div 0,5) l_{eff} + 0,5a. \qquad (3)$$

Thus, the method of calculating the depth of seal of a console beam in a bricklaying is offered.

1) We are given the value of l_{eff} (from materials of the project or from the results of the survey);

2) From formula (3) we obtain for a given value <*C*> the value of *e* <*a*>;

3) From formula (2) we find the value of <*a*> and we compare them;

4) We repeat with the new value <*C*>.

The calculation ends when the process converges to this technical tolerance.

REFERENCES

1. TCP 45-5.02-82-2010. Stone and reinforced stone constructions. – Minsk : Ministry of architecture and construction of Republic of Belarus, 2010.
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