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Investigations into the load-bearing behaviour of clay masonry under double eccentric compressive stress (Az.: ZP 52-5-15.98-1406/12)

1. Scope

To determine characteristic values of the compressive strength of masonry, centric wall compression tests are carried out on this masonry as part of the approval procedure. For masonry blocks with large hole cross-sections, double eccentric wall tests are also usually carried out. For the determination of design values, a ratio of double eccentric to centric masonry compressive strength of 0.9 is still considered acceptable with regard to the safety concept. The aim of this research work was to create a database for the evaluation of the load-bearing behaviour of masonry made of bricks under double eccentric and centric compressive stress.

2. Investigation program

Three high precision units with different hole patterns were used to investigate the load-bearing behaviour of masonry under centric and double eccentric compressive stress. The eccentricity of the double eccentric tests was 1/6 of the wall thickness with respect to the vertical axis of the centre of gravity of the test wall. During the production of the test walls from the high precision units, the overlay dimension was varied in order to investigate two arrangements of the cross webs: (i) web on web (ii) web on hole.

3. Test results

In the framework of the research project, ratio values of double eccentric to centric masonry compressive strength of 0.56 to 0.86 were determined, depending on the hole patterns of the high precision units and the arrangement of the cross webs (web to web or web to hole). It was found that certain hole patterns in both centric and double eccentric masonry compressive strength, show a clear dependence of the determined compressive strengths on the arrangement of the cross webs. Differences of 31 % were observed with respect to the variation of the arrangement of the cross webs. Characteristic design values for the investigated high precision units types were then derived from the test results and compared with the values provided by the technical approvals. It was found that for high precision units with small hole cross-sections, for which no double-eccentric wall tests have been carried out to date to determine the design values in the approval procedure, the values provided by the approvals are not on the safe side in the test, depending on the type of high precision unit and the web arrangement.