

[Calculation of fibre-cement plates]

On request of the Deutsches Institut für Bautechnik analyses of fibre-cement plates were carried out in conformity with the old and new generation of standards.

Impact of Wind

Fibre-cement plates are stressed mainly by the loading case 'wind' apart from their own permanent weight. With the implementation of the new wind load standard DIN 1055-4 (03/05), a standardized level of security for the classification of wind loads was introduced in Germany. In conformity with the postulated level of security particularly in Northern Germany a clear increase in wind loads compared with the old wind load standard had to be implemented.

In consideration of the improvement according to new standard of the external pressure level (c_{pe} -value) it could be shown that according to the new standard, as a rule, considerably higher wind loads must be assumed for the lee-side areas "B" than would be expected according to the old standard. The increase varies depending on the wind zone, the height of dimensioning and the areas of load impact for the assessment of the c_p -value. (cf. enclosures 2 to 4).

By taking into consideration DIN 1055-4 (03/05), par. 12.1.10 concerning external wall panelling the stress on external wall panelling caused by wind can be reduced considerably. At this point attention must be paid to the strain caused by wind on the back ventilation space to be absorbed.

As fibre-cement plates are widely used in back ventilated structures, paragraphs 2.1.1 and 2.1.2 dwell on the basic applicability of the wind load standard upon this type of construction. Thus the application of wind load in ventilated structures has been described rather imprecisely to date.

Method of Calculation for Fibre-Cement Plates

Calculation of fibre-cement plates is carried out by means of different methods of engineering calculation. After computation was carried out with the conventional method of comparative calculation (Hees, Zuber) on one hand and aided by a FEM-programme on the other hand (programme by Eternit), the results were compared. The implementation of the FEM-programme incorporating new results of research as to the load bearing properties of fibre-cement plates can lead to a much more economic dimensioning (cf. par. 4).

Partial Safety Factor

To achieve a level of security for fibre-cement plates comparable with the old set of standards, a partial safety factor $\gamma_{FZ} = 1,65$ should be used. The safety factor has to be applied to the diminished characteristic bending strength, owing to tests of long-term stability.

Paragraph 5.2.2 shows how a lack of quality assurance during the production process takes effect on the safety factor γ_{FZ} to be applied.