

SECTION 8. DESIGN OF *mortarless* MASONRY MEMBERS FOR BENDING

All *mortarless* walls are fully grouted and they are readily reinforced with certainty of the reinforcement positioning within. As such they can readily be designed for flexure as members spanning vertically, horizontally or both.

8.1 Reinforced *mortarless* walls subject to out-of-plane bending:

The provisions of IS 456:2000 Part 38 (Limit State of Collapse : Flexure) are used for the design of *mortarless* walls for out of plane bending.

Clause 38.1 requires the following assumptions be made when analysing a cross section to determine its design moment of resistance:

- a) Plane sections normal to the axis remain plane after bending;
- b) Compressive stress distribution is represented by an equivalent rectangle where the stress is $0.67f_{ck}/1.5$ (1.5 being the partial safety factor for concrete γ_m) and the depth of the compression block is $0.84x_u$ where x_u is the depth to the neutral axis from the outermost compression fibre
- c) The maximum strain in the outermost compression fibre at failure is 0.0035;
- d) The tensile strength of the masonry is ignored;
- e) The partial safety factor for the reinforcing steel $\gamma_m = 1.15$; and
- f) The limiting value of x_u/d for steel of $f_y = 500\text{MPa}$ is 0.46 (to guard against compression failure)

IS 456:2000 Clause 32.3.2 permits the design of walls simply as slabs in accordance with the appropriate provisions of Part 24 provided the design axial load does not exceed $0.04f_{ck}A_g$ where A_g is the gross area of the section. This amounts to a maximum axial compression load 139 kN/m for walls constructed with 200 *mortarless* walls when $f_{ck}=20\text{MPa}$ and 174 kN/m when $f_{ck}=25\text{MPa}$.

8.2 Reinforced *mortarless* beams, i.e. *mortarless* walls subject to in-plane bending:

The recommended limiting span to effective depth ratios for beams are as follows:

- 20 for simply supported beams,
- 26 for continuous beams, and
- 7 for cantilever beams.

The section should be designed in accordance with the provisions of IS 456:2000 Part 23 and Parts 38 and 40. Special consideration needs to be given to the detailing of any required shear reinforcement.