

5. STEEL BEAM & POST

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STEEL BEAMS IN RESIDENTIAL BUILDINGS

When the load and spans exceed the capacity of timber beams, it becomes necessary to resort to steel beams. In many residential applications, the design (selection) of a steel beam is controlled not by strength limits but by deflection limits. This means that often a smaller steel beam might be sufficiently strong to carry a load, but would deflect excessively, so that a larger steel beam needs to be selected. Small steel beams may have their ends supported by timber posts (or multiple timber studs) but for very long beams carrying heavy loads, steel posts need to be used.

STEEL POSTS

In residential construction (and often in offices) it is desirable to hide the steel posts supporting steel beams within the thickness of the timber framed walls. This means that the 90 x 90 x 5 RHS steel posts are commonly used because they fit nicely inside a 100 x 50 timber framed wall. However because both their x and y dimensions are small, the beam-and-posts combination has no lateral load resistance. If the beam-and-post combination is required to also resist lateral loads, then we must use PFCs (parallel flanged channels) or similar for the posts and weld the joints between the beams and the posts to form a frame.

STEEL BRACING FRAMES

In the design of residential buildings, it often happens that large open-plan areas and/or wind windows mean that there insufficient lengths of wall to provide bracing (lateral load resistance.) A common solution is provide steel bracing frames which can provide lateral load resistance will at the same time allowing large openings. As with all steel structures, the strength of a steel bracing frame (ability to resist laterals loads) often exceeds its allowable deflection and a larger steel section (size) needs to specified. In some cases, it may be necessary to heavily bolt the base of the frame to the concrete floor to increase its stiffness or in extreme cases, the frame will need to incorporate a steel sill member (form a box shape) so that the deflection under load is less than about 6 mm.