

A Technical Note on The Use of Steel Plate Shear Wall Inside a Reinforced Concrete Moment Frame.

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Recently I have received a question regarding how one can use steel plate shear walls inside a reinforced concrete frame and what precautions one should take. Here are some suggestions.

1. The RC frame is preferred to be “special” ductile moment frame. However, intermediate RC moment frames may also be used along with appropriate R factor. Ordinary moment frames are not recommended.
2. Following two connections are suggested to connect the steel shear wall to RC moment frame. In the left detail, a continuous plate is placed on the interior face of columns and beams with shear studs behind the plate embedded inside concrete. In the detail to the right, the boundary beams and columns are composite with steel columns and beams embedded inside the RC boundary elements. The beams and columns have “fin” plates which later will be used to weld the steel plate to them.
3. All connections, including the welds and shear studs, should be designed to develop the strength of connected part.
4. The governing failure mode of all elements should be yielding of steel and not fracture of steel or crushing of concrete.
5. As a system, the governing failure mode of the system should be yielding of steel plate shear wall, followed by formation of plastic hinges in ductile special moment frame.
6. Failure of columns should be avoided throughout the loading up to failure of the system.

