CODE

(c) Anchor or anchor groups shall be designed for the maximum shear obtained from factored load combinations that include E, with E_h increased by Ω_o.

17.10.6.4 If anchor reinforcement is provided in accordance with 17.5.2.1(b), no reduction in design shear strength beyond that given in 17.5.2.1 shall be required.

17.10.7 *Tension and shear interaction*

17.10.7.1 Single anchors or anchor groups that resist both tensile and shear forces shall be designed in accordance with 17.8, and the anchor design tensile strength calculated in accordance with 17.10.5.4.

17.11—Attachments with shear lugs

17.11.1 *General*

17.11.1.1 It is permitted to design attachments with shear lugs in accordance with 17.11.1.1.1 through 17.11.1.1.9. Alternatively, it is permitted to design using alternative methods if adequate strength and load transfer can be demonstrated by analysis or tests.

17.11.1.1.1 Shear lugs shall be constructed of rectangular plates, or steel shapes composed of plate-like elements, welded to an attachment base plate.

COMMENTARY

slippage combined with bolt bending provided the required ductility and toughness for the structural walls and limited the loads acting on the bolts. Procedures for defining bearing and shear limit states for connections to cold-formed steel are described in AISI S100, and examples of strength calculations are provided in the AISI manual (AISI D100). In such cases, exceeding the bearing strength may lead to tearing and an unacceptable loss of connectivity. If anchors are located far from edges, it may not be possible to design such that anchor reinforcement controls the anchor strength. In such cases, anchors should be designed for overstrength in accordance with option (c).

R17.10.6.4 If anchor reinforcement conforming to 17.5.2.1b is used, with the properties as defined in 20.2.2.5, separation of the potential breakout from the substrate is unlikely to occur provided the anchor reinforcement is designed for a force exceeding the concrete breakout strength.

R17.11—Attachments with shear lugs

R17.11.1 *General*

R17.11.1.1 The provisions of 17.11 cover concrete failure modes of attachments with shear lugs. These provisions do not cover the steel or welding design of the attachment base plate or shear lugs.

Attachments with shear lugs may be embedded in cast-in-place or precast concrete, or post-installed by using a blockout in the concrete that receives the shear lug and is then filled with a fluid, non-shrink grout as shown in Fig. R17.11.1.1a. Base plates with anchors provide moment resistance, which prevents pryout action on the shear lugs. Attachments with embedded shapes and without base plates and anchors, which must resist moment by pryout action on the embedment, are not covered in this section.

Bearing strength in shear refers to the strength prior to concrete fracture in front of the shear lug. Bearing failure occurs at small displacements (Cook and Michler 2017). Following bearing failure, there is a significant decrease in strength and increase in lateral displacement leading eventually to steel failure of the anchors (Fig. R17.11.1.1b) at lateral displacements at least an order of magnitude greater than that corresponding to bearing failure.

Types of attachments with shear lugs that satisfy 17.11.1.1 through 17.11.1.1.9 are shown in Fig. R17.11.1.1a. Shear lugs that are different than those covered in 17.11.1.1 through 17.11.1.1.9, such as shear lugs composed of steel