CODE

22.5.7.5 At locations corresponding to a reduced effective prestress force according to 22.5.7.4, V_c shall be calculated in accordance with (a) through (c):

(a) The reduced effective prestress force shall be used to determine the applicability of 22.5.6.2.
(b) The reduced effective prestress force shall be used to calculate V_c in accordance with 22.5.6.3.
(c) The value of V_c calculated using 22.5.6.2 shall not exceed the value of V_{cw} calculated using the reduced effective prestress force.

22.5.8 *One-way shear reinforcement*

22.5.8.1 At each section where $V_u > \phi V_c$, transverse reinforcement shall be provided such that Eq. (22.5.8.1) is satisfied.

$$V_s \geq \frac{V_u}{\phi} - V_c \qquad (22.5.8.1)$$

22.5.8.2 For one-way members reinforced with transverse reinforcement, V_s shall be calculated in accordance with 22.5.8.5.

22.5.8.3 For one-way members reinforced with bent-up longitudinal bars, V_s shall be calculated in accordance with 22.5.8.6.

22.5.8.4 If more than one type of shear reinforcement is provided to reinforce the same portion of a member, V_s shall be the sum of the V_s values for the various types of shear reinforcement.

22.5.8.5 *One-way shear strength provided by transverse reinforcement*

22.5.8.5.1 In nonprestressed and prestressed members, shear reinforcement satisfying (a), (b), or (c) shall be permitted:

(a) Stirrups, ties, or hoops perpendicular to longitudinal axis of member
(b) Welded wire reinforcement with wires located perpendicular to longitudinal axis of member
(c) Spiral reinforcement

COMMENTARY

R22.5.8 *One-way shear reinforcement*

R22.5.8.2 Provisions of 22.5.8.5 apply to all types of transverse reinforcement, including stirrups, ties, hoops, crossties, and spirals.

R22.5.8.5 *One-way shear strength provided by transverse reinforcement*

Design of shear reinforcement is based on a modified truss analogy. In the truss analogy, the force in vertical ties is resisted by shear reinforcement. Shear reinforcement needs to be designed to resist only the shear exceeding that which causes inclined cracking, provided the diagonal members in the truss are assumed to be inclined at 45 degrees. The concrete is assumed to contribute to the shear capacity through resistance across the concrete compressive zone, aggregate interlock, and dowel action in an amount equivalent to that which caused inclined cracking.

Equations (22.5.8.5.3), (22.5.8.5.4), and (22.5.8.6.2a) are presented in terms of nominal shear strength provided by shear reinforcement, V_s. Where shear reinforcement perpendicular to the axis of the member is used, the required area of shear reinforcement, A_v, and its spacing, s, are calculated by