

Figure 6.15.8 Shear strength of welded headed studs

**i—Design shear strength limited by concrete:**

$$\phi V_c = \phi V_c' C_w C_t C_c \quad (\text{Eq. 6.5.7})$$

where:

$$\phi V_c' = \phi 12.5 d_e^{1.5} \lambda \sqrt{f_c'} \quad (\text{Eq. 6.5.8})$$

$$C_w = \left( 1 + \frac{b}{3.5 d_e} \right) \leq n_s$$

$$C_t = \frac{h}{1.3 d_e} \leq 1.0$$

$$C_c = \left[ 0.4 + 0.7 \left( \frac{d_c}{d_e} \right) \right] \leq 1.0$$

Table A gives values for  $\phi = 0.85$

Where:  $n_s$  = number of studs in back row; see figure for notation

**ii—Design shear strength limited by steel:**

$$\phi V_y = (31,800 d_b^2) n \quad (\text{Eq. 6.5.12a})$$

Table B gives value for  $n = 1, \phi = 0.9$

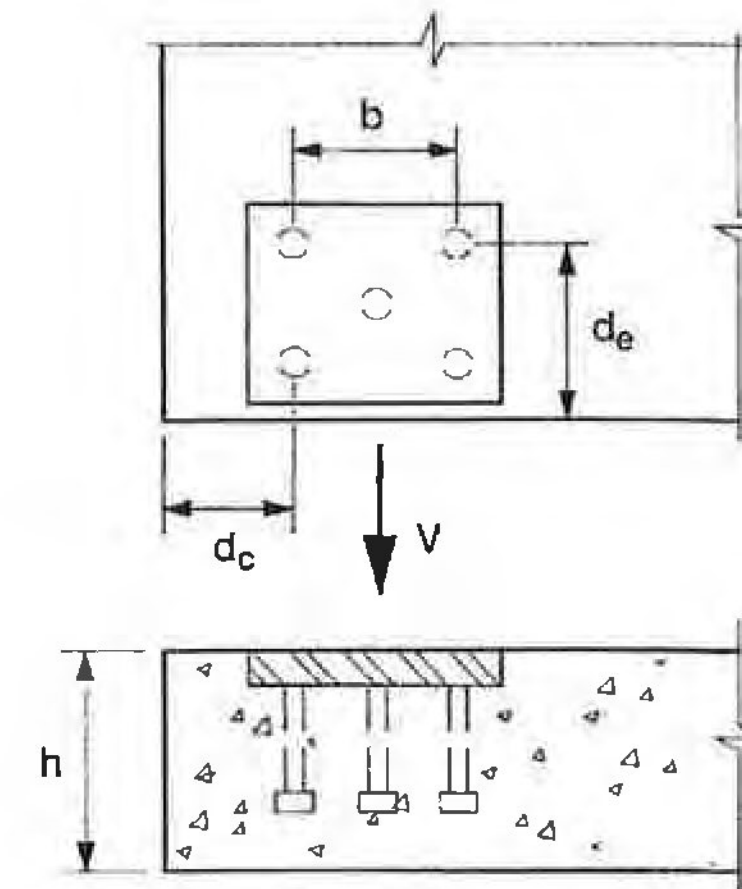


Table A— $\phi V_c'$ , kips

| $f_c'$ , psi | 4000      |       | 5000  |       | 6000  |       | 7000  |       | 8000  |       |
|--------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|              | $\lambda$ | 1.0   | 0.85  | 1.0   | 0.85  | 1.0   | 0.85  | 1.0   | 0.85  | 1.0   |
| 2            | 1.90      | 1.62  | 2.12  | 1.81  | 2.33  | 1.98  | 2.51  | 2.14  | 2.69  | 2.29  |
| 3            | 3.49      | 2.97  | 3.90  | 3.31  | 4.26  | 3.63  | 4.62  | 3.82  | 4.94  | 4.20  |
| 4            | 5.38      | 4.57  | 6.00  | 5.11  | 6.58  | 5.59  | 7.11  | 6.04  | 7.60  | 6.46  |
| 5            | 7.51      | 6.38  | 8.39  | 7.14  | 9.19  | 7.82  | 9.94  | 8.45  | 10.62 | 9.03  |
| 6            | 9.88      | 8.40  | 11.04 | 9.39  | 12.09 | 10.29 | 13.08 | 11.11 | 13.97 | 11.87 |
| 7            | 12.45     | 10.58 | 13.91 | 11.82 | 15.24 | 12.95 | 16.46 | 13.99 | 17.60 | 14.96 |
| 8            | 15.20     | 12.82 | 16.99 | 14.44 | 18.61 | 15.81 | 20.12 | 17.08 | 21.50 | 18.27 |
| 9            | 18.14     | 15.44 | 20.28 | 17.24 | 22.21 | 18.88 | 23.99 | 20.40 | 25.65 | 21.80 |
| 10           | 21.25     | 18.06 | 23.75 | 20.18 | 26.01 | 22.11 | 28.11 | 23.88 | 30.04 | 25.53 |
| 11           | 24.52     | 20.84 | 27.41 | 23.30 | 30.03 | 25.52 | 32.43 | 27.57 | 34.67 | 29.47 |
| 12           | 27.94     | 23.74 | 31.22 | 26.53 | 34.20 | 29.07 | 36.94 | 31.40 | 39.49 | 33.67 |

Table B— $\phi V_y$ , kips

| Diameter, in. | 1/4 | 3/8 | 1/2 | 5/8  | 3/4  | 7/8  |
|---------------|-----|-----|-----|------|------|------|
| $\phi V_y$    | 2.0 | 4.5 | 8.0 | 12.4 | 17.9 | 24.4 |