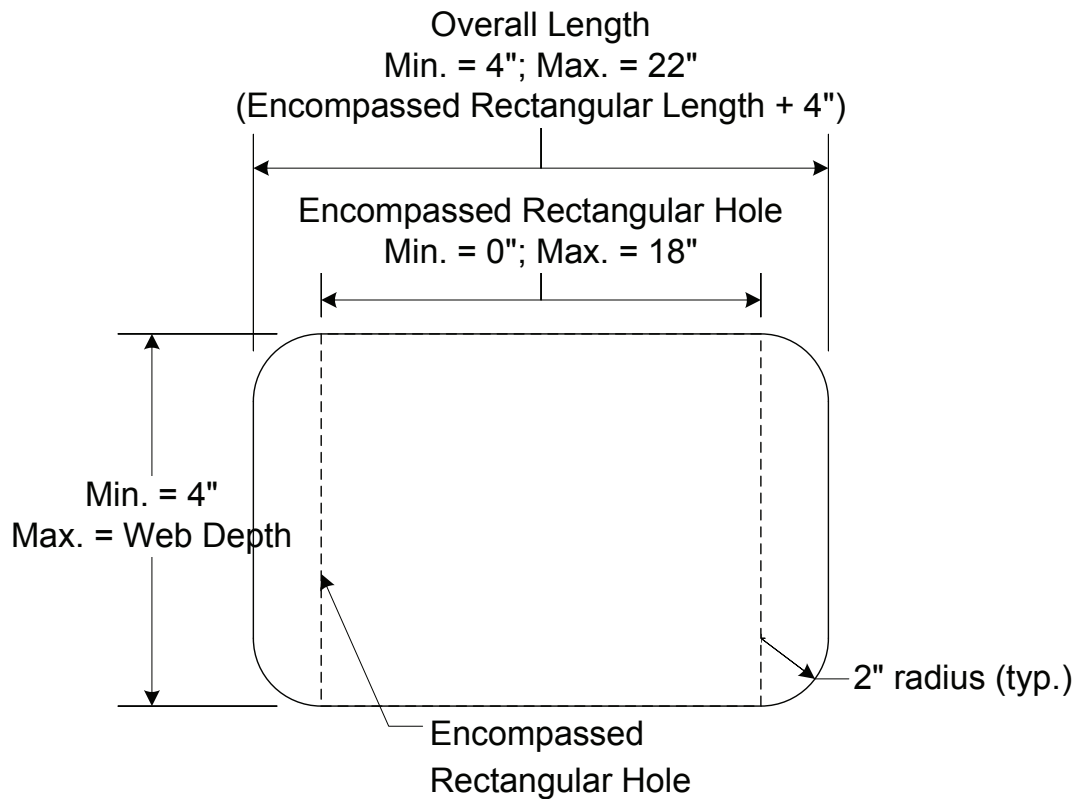




Rounded Rectangular Web Holes in BCI® Joists

A new web hole type, rounded rectangular, has been recently approved to be cut in BCI® joists. As shown in the detail and photograph below, a rounded rectangular hole has a 2" radius at all corners. The rounded corners allow for an increase in hole shear capacity, compared to a standard rectangular hole with 90° corners. This increase allows for a longer encompassing web hole. Rounded rectangular holes may be cut either by an automated saw system or in the field.





The recent reductions in allowable rectangular web shear capacity with BCI[®] SP “1000” Series joists (4500s, 5000s, 6000s, and 6500s) can be mitigated by using a rounded rectangular hole that encompasses the original rectangular hole. The longer encompassing rounded rectangular hole has the same allowable shear as the previous rectangular holes in BCI[®] SP “1000” Series.

The hole shear capacity (V_{hole}) for rounded rectangular holes may be calculated with the following equation:

$$V_{hole} = V_{BCI} \left[B_R - C_{HD} \left(\frac{Hole\ Depth}{Joist\ Depth - (2 * Flange\ Depth)} \right) - C_{HL} \left(\frac{Overall\ Hole\ Length - 4}{18} \right) \right]$$

where:

V_{BCI} = allowable BCI[®] Joist shear

B_R = initial shear reduction coefficient = 0.60

C_{HD} = hole depth coefficient = 0.280

C_{HL} = hole length coefficient = 0.249 for all BCI[®] Joists

Hole Depth: Minimum = 4”, Maximum = Web Depth

Overall Hole Length: Minimum = 4”, Maximum = 22”

Based upon recent qualification testing, BCI[®] ICC-ES[®] ESR-1336 will be updated in the near future with reference to rounded rectangular web holes in Section 4.6. *Holes in I-Joist Web*.

Rounded rectangular web hole analysis will be added to Boise Cascade software as well. BC Calc[®] will be updated first, releasing in October 2019. Implementation into BC Framer[®] is estimated to take place in January 2020. Prior to the BC Calc[®] release, designers may contact Boise Cascade EWP Engineering for design review and new rounded rectangular hole analysis calculations.

This rounded rectangular web hole shear methodology may be used for BCI[®] SP 1000 series joist rectangular holes that passed design previously but now are over 100% allowable. If a new rounded rectangular hole is not feasible, please refer to Boise Cascade Technical Note IJ-31 *Rectangular Web Holes in BCI[®] Joists* for suggested design or field applied solutions.