

Span Adjustment Factor for Holes in RFPI-Joists

Q: What is the span adjustment factor (SAF) for?

A: The distances listed in the hole chart are based on the worst case shear condition generated from all of the spans, on center spacings and loading conditions found in the “Allowable Floor Span” charts. Therefore, when considering actual conditions, the distances listed in the chart may be rather conservative. If the actual span of the joist in question is less than the maximum allowable span (generally the case), the span adjustment factor is used to determine if and how much closer the hole can be moved toward the bearing.

Q: Where does the span adjustment factor come from?

A: The span adjustment factor is simply the shortest span from the span chart for a given series and depth. For example, open the design guide to the “Allowable Floor Spans” chart and find the shortest span listed for a 9-1/2” RFPI 20 for all of the conditions shown. The shortest span is 11’-1”, which is where the span adjustment factor of 11.08’ comes from.

Q: How does the span adjustment factor work?

A: If your actual span is less than the span adjustment factor, you simply take the ratio of “Actual Span” to “Span Adjustment Factor” and multiply this ratio by the distance shown in the hole table for the hole size in question.

Q: Why can a hole be moved closer to the bearing if the actual span is less than the span adjustment factor?

A: Allowable hole locations are controlled by shear stress. The higher the shear, the smaller the allowable hole size or the further from bearing a hole must be moved. For a given uniform loading situation, a shorter span will develop a smaller shear value than a longer span; therefore, the hole in question can be located closer to the bearing for the shorter span with the lower shear.

Q: Is it possible that a hole can still be placed closer to the bearing even if the SAF calculation has been used?

A: Yes, it is possible that a hole could be placed closer to a bearing than the distance calculated using the SAF method. Depending on the actual span and loading conditions, even the SAF method might give conservative results. The most accurate way (and least conservative way) to determine the allowable location of a hole is to use the sizing software with the actual conditions.

Example Using SAF:

- Joist = 11-7/8” RFPI 70
- Actual span = 12’-7”
- Round hole size required = 5”
- According to hole table, the centerline of the hole must be placed 4’-6” from the face of the nearest bearing.
- Re-check using the SAF:
$$\text{Actual span} / \text{SAF} \times 4'-6" = 12.583' / 15.33 \times 4'-6" = 0.82 \times 4.5' = 3.6937' = 3'-8.32"$$

Best to round up to the nearest inch = 3’-9”
- Therefore, due to the lower shear based on the actual span, the hole can be located 3’-9” from the bearing rather than 4’-6”.