

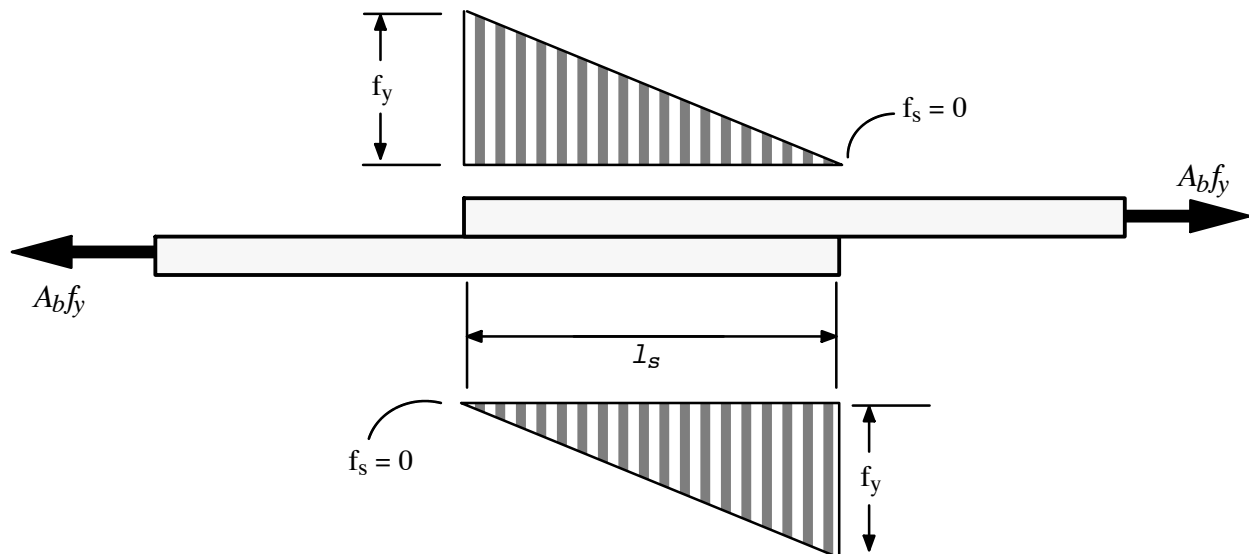
Bar Splices (ACI 12.14 - 12.16, Chapter 10 of text)

In general reinforcing bars are stocked by suppliers in lengths of 60 ft for bars from No. 5 to No. 18, and in 20 to 40 ft lengths for smaller bar sizes. For this reason, and because it is often more convenient to work with shorter bar lengths, it is frequently necessary to splice bars in the field. Should try to:

- Stagger splices;
- Avoid splicing at points of maximum stress.

Lab Splices in Tension (ACI 12.14)

Splices for No. 11 bars and smaller are usually made simply by lapping the bars in a sufficient distance to transfer stress by bond from one bar to the other. The lapped bars are usually placed in contact and lightly wired so that they stay in position as the concrete is poured.



- ACI 12.14.2.1. Lap splices should not be used for bars larger than No. 11 bars.
- Required lap for tension splices, may be stated in terms of development in tension l_d . Find l_{db} according to code, use the modification factors (reduction for excess reinforcement should not be applied because that factor is already accounted for in the splice specification).
- Two classes of lap splices are specified by the ACI Code. The minimum length l_s not less than 12 inches is:

$$\begin{array}{ll} \text{Class A:} & l_s = 1.0 l_d \\ \text{Class B:} & l_s = 1.3 l_d \end{array} \quad \text{ACI Sect. (12.15)}$$

The the work sheet provided in the next page of tension lab splices.

Tension Lap Splice Calculation Work Sheet

1. Tension Development Length (from Tension Development Calculation Work Sheet except that step 8 should not be applied).

$$l_d =$$

2. Lap Splice Classes (Section 12.15.1)

$$\text{Class A: } l_s = 1.0 l_d =$$

$$\text{Class B: } l_s = 1.3 l_d =$$

- 3a. Required Lap Splices - other than Columns (12.15.2)

(A _s provided) / (A _s required)*	Maximum percent of A _s spliced within required lap length	
	<= 50	>50
>= 2	Class A	Class B
< 2	Class B	Class B
* Ratio of area of reinforcement provided to area of reinforcement require		

$$LAP =$$

- 3a. Required Lap Splices - Columns (12.17.2)

Maximum stress in the bar	Maximum percent of A _s spliced within required lap length	
	<= 50%	> 50%
> 0.5f _y	Class A	Class B
<= 0.5f _y	Class B	Class B
* Ratio of area of reinforcement provided to area of reinforcement require		

$$LAP =$$

Compression Splices (ACI 12.16)

Reinforcing bars in compression are spliced mainly in columns, where bars are normally terminated just above each floor or every other floor. This is done partly for construction convenience, to avoid handling and supporting very long column bars, but it is also done to permit column steel area to be reduced in steps, as loads become lighter at higher floors.

The lap length l_s should be equal to at least the development length in compression and the modifiers. l_s should also satisfy the following, but not less than 12 inches:

if $f'_c > 3,000$ psi then

$$f_y \leq 60,000 \text{ psi} \quad l_s \geq 0.0005f_y d_b$$

$$f_y > 60,000 \text{ psi} \quad l_s \geq (0.0009f_y - 24)d_b$$

if $f'_c < 3,000$ psi then

$$f_y \leq 60,000 \text{ psi} \quad l_s \geq 1.333 \times 0.0005f_y d_b$$

$$f_y > 60,000 \text{ psi} \quad l_s \geq 1.333 \times (0.0009f_y - 24)d_b$$

Column Splices (ACI 12.17.2)