

Effective length factor

How is a frame assigned a sidesway-uninhibited condition, rather than sidesway-inhibited?

Extended Question: Further, should I use the effective length factors automatically calculated through SAP2000? $K = 1.0$ for all members under any configuration, which does not seem accurate. Should K factors be input manually?

Answer:

CSI Software implements a rigorous process to determine K factors. A full description is available in the [CSI Steel Frame Design Manual](#) (Help > Documentation > Design > Steel Frame Design > Design Algorithms > Element Unsupported Lengths > Effective Length Factor).

A notable point mentioned in this section (pages 11-14) is that K-factor calculations are based on the assumption of uninhibited sidesway. For other cases, K factors should be specified by the user. Users should always, however, use engineering judgment to evaluate the accuracy of K factors calculated by computational tools. Any discrepancy between the unbraced properties modeled and the actual design intention may lead to inappropriate design.

Automatically-generated K factors may be overwritten for individual members using the Overwrite option under Stress Check Information, as shown in Figure 1:

The image shows two overlapping dialog boxes from SAP2000. The left dialog, 'Steel Stress Check Information (AISC-LRFD93)', displays a table of member properties. The right dialog, 'Steel Frame Design Overwrites for AISC-LRFD93', shows a list of design parameters with their values. A red box highlights items 18 through 21 in the right dialog, which are related to effective length factors. A red arrow points from the 'Overwrites' button in the left dialog to the highlighted area in the right dialog.

COMBO	STATION	LOC	RATIO	MOMENT INTERACTION CHECK	AXL + B-MAJ + B-MIN	RATIO	MIN-SHR	RATIO
DSTL1	0.00		0.209 (C)	= 0.209 + 0.000 + 0.000	0.000	0.002		
DSTL1	12.50		0.277 (C)	= 0.203 + 0.000 + 0.074	0.000	0.002		
DSTL1	25.00		0.266 (C)	= 0.098 + 0.000 + 0.167	0.000	0.002		
DSTL2	0.00		0.090 (C)	= 0.090 + 0.000 + 0.000	0.000	0.002		
DSTL2	12.50		0.159 (C)	= 0.087 + 0.000 + 0.072	0.000	0.002		
DSTL2	25.00		0.228 (C)	= 0.084 + 0.000 + 0.144	0.000	0.002		

Item	Value
1 Current Design Section	Program Determined
2 Framing Type	Program Determined
3 Consider Deflection?	No
4 Deflection Check Type	Program Determined
5 DL Limit, L /	Program Determined
6 Super DL+LL Limit, L /	Program Determined
7 Live Load Limit, L /	Program Determined
8 Total Limit, L /	Program Determined
9 Total-Camber Limit, L /	Program Determined
10 DL Limit, abs	Program Determined
11 Super DL+LL Limit, abs	Program Determined
12 Live Load Limit, abs	Program Determined
13 Total Limit, abs	Program Determined
14 Total-Camber Limit, abs	Program Determined
15 Specified Camber	Program Determined
16 Net Area to Total Area Ratio	Program Determined
17 Live Load Reduction Factor	Program Determined
18 Unbraced Length Ratio (Major)	1.
19 Unbraced Length Ratio (Minor, LTB)	1.
20 Effective Length Factor (K-Major)	1.
21 Effective Length Factor (K-Minor)	1.
22 Moment Coefficient (Cm-Major)	Program Determined
23 Moment Coefficient (Cm-Minor)	Program Determined
24 Bending Coefficient (Cb)	Program Determined

Figure 1 - Frame-property overwrite

See Also

- [Sway and nonsway conditions article](#)