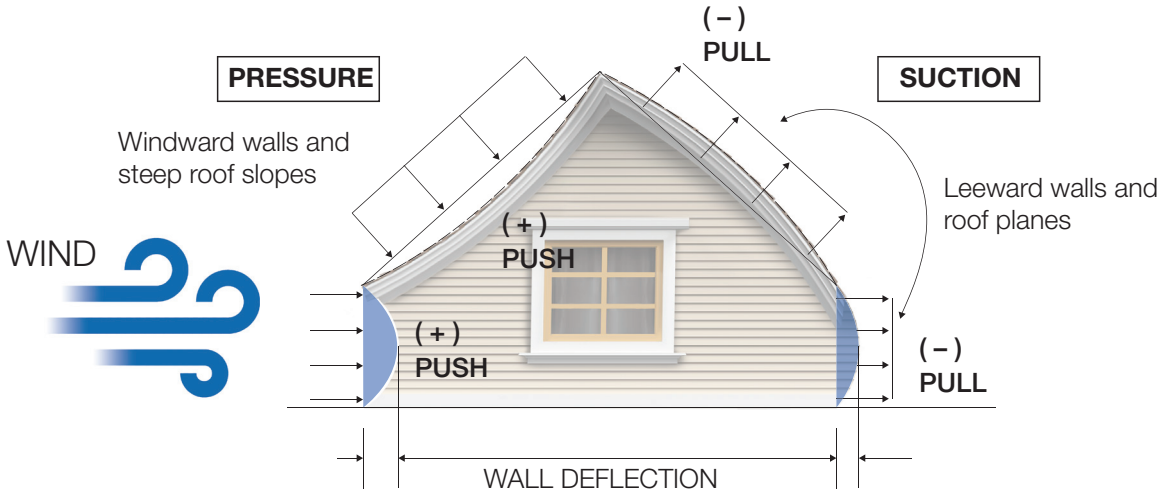
Wall Frame Deflection Limit for Fiber Cement Claddings

Technical Brief 14

Framing members or structural members must be selected and installed according to their ability to handle the loads they will be subjected to. In the case of exterior wall cladding (finish) these are typically earthquake or wind loads.

Deflection is the bending caused by loading. All structural members will deflect under load. The extent of deflection depends on the magnitude of the load applied, the span of the structural member, and the stiffness of the structural member. Allowable deflection within the building codes is expressed as a fraction of the span.



In accordance with the building codes, the structural systems and structural members that cladding materials are attached to shall be designed to have adequate stiffness to limit the deflections. The 2018 International Building Code and International Residential Code specify the structural member deflection limits in Table 1604.3 and Table R301.7, respectively, which are referenced below.

Table 1604.3 Deflection Limits (2018 IBC)

CONSTRUCTION	L or L_r	S or W[f]	D + L[d, g]
Exterior walls:	–		
With plaster or stucco finishes	–	//360	–
With other brittle finishes	–	//240	–
With flexible finishes	–	//120	–

D = Dead load L = Live load S = Snow load W = Load due to wind pressure

f. The wind load is permitted to be taken as 0.42 times the “component and cladding” loads or directly calculated using the 10-year mean return interval wind speed for the purpose of determining deflection limits in Table 1604.3.

i. l = Length of the member between supports. For cantilever members, l shall be taken as twice the length of the cantilever.

Table R301.7 Allowable Deflection of Structural Members (2018 IRC)

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Exterior wall - windloads[a] with plaster or stucco finish	H/360
Exterior walls - wing loads[a] with other brittle finishes	H/240
Exterior walls - wing loads[a] with other flexible finishes	H/120d

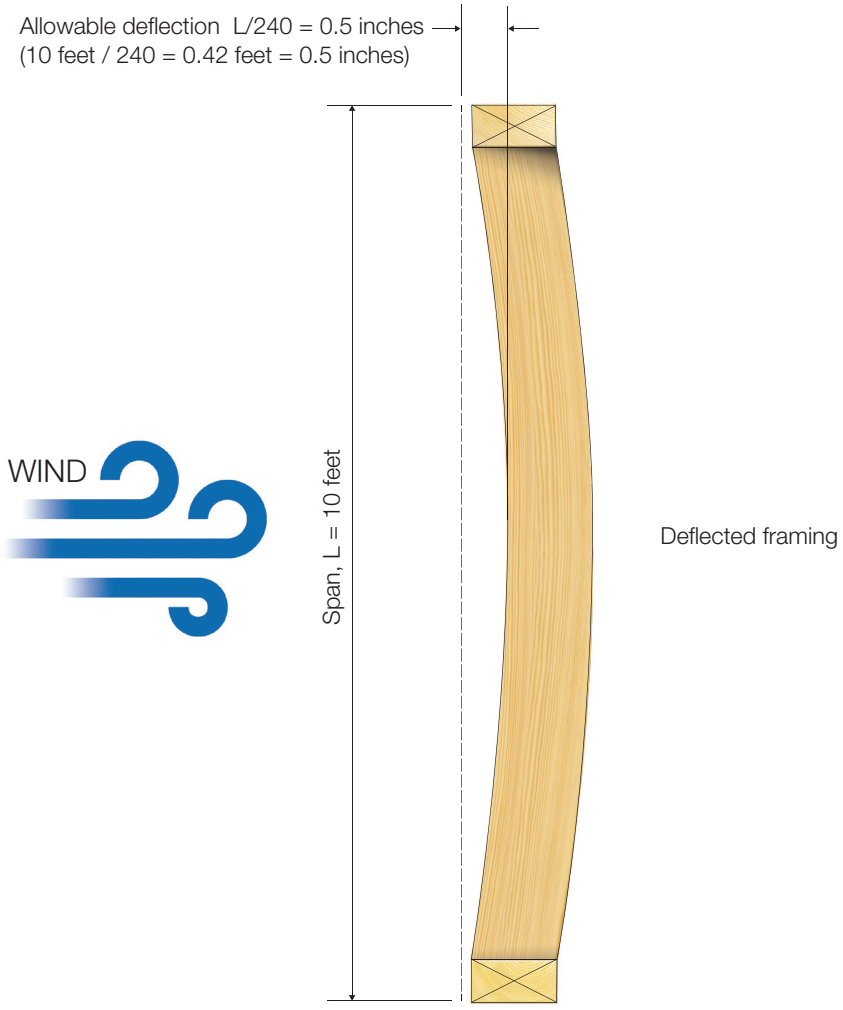
a. For the purpose of determining deflection limits herein, the wind load shall be permitted to be taken as 0.7 times the component and cladding (ASD) loads obtained from Table R301.2(2).

Fiber cement cladding is considered as a brittle finish, so a deflection limit of L/240 or H/240 (L, H = length of the span) shall be used for the design of wall frames and/or other structural members supporting the cladding, such as furring.

For example where the span length, L, is 10 feet, then deflection limit can be determined as follows:

Deflection limit = L / 240 = 10 ft. / 240

= 0.042 ft. or 0.5 in.



The calculated deflections shall not exceed the lowest defection limit of all the elements or finished materials used on the wall assembly.