

CODE

24.2.2 Deflections calculated in accordance with 24.2.3 through 24.2.5 shall not exceed the limits in Table 24.2.2.

COMMENTARY

R24.2.2 It should be noted that the limitations given in Table 24.2.2 relate only to supported or attached nonstructural elements. For those structures in which structural members are likely to be affected by deflection or deformation of members to which they are attached in such a manner as to affect adversely the strength of the structure, these deflections and the resulting forces should be considered explicitly in the analysis and design of the structures as required by 24.2.1 (ACI 209R).

When time-dependent deflections are calculated, the portion of the deflection before attachment of the nonstructural elements may be deducted. In making this correction, use may be made of the curve in Fig. R24.2.4.1 for members of usual sizes and shapes.

Table 24.2.2—Maximum permissible calculated deflections

Member	Condition		Deflection to be considered	Deflection limitation
Flat roofs	Not supporting or attached to nonstructural elements likely to be damaged by large deflections Immediate deflection due to L		Immediate deflection due to maximum of L_r , S , and R	$\ell/180^{[1]}$
Floors			$\ell/360$	
Roof or floors	Supporting or attached to nonstructural elements	Likely to be damaged by large deflections	That part of the total deflection occurring after attachment of nonstructural elements, which is the sum of the time-dependent deflection due to all sustained loads and the immediate deflection due to any additional live load ^[2]	$\ell/480^{[3]}$
		Not likely to be damaged by large deflections		$\ell/240^{[4]}$

^[1]Limit not intended to safeguard against ponding. Ponding shall be checked by calculations of deflection, including added deflections due to ponded water, and considering time-dependent effects of sustained loads, camber, construction tolerances, and reliability of provisions for drainage.

^[2]Time-dependent deflection shall be calculated in accordance with 24.2.4, but shall be permitted to be reduced by amount of deflection calculated to occur before attachment of nonstructural elements. This amount shall be calculated on basis of accepted engineering data relating to time-deflection characteristics of members similar to those being considered.

^[3]Limit shall be permitted to be exceeded if measures are taken to prevent damage to supported or attached elements.

^[4]Limit shall not exceed tolerance provided for nonstructural elements.

24.2.3 Calculation of immediate deflections

24.2.3.1 Immediate deflections shall be calculated using methods or formulas for elastic deflections, considering effects of cracking and reinforcement on member stiffness.

24.2.3.2 Effect of variation of cross-sectional properties, such as haunches, shall be considered when calculating deflections.

24.2.3.3 Deflections in two-way slab systems shall be calculated taking into account size and shape of the panel, conditions of support, and nature of restraints at the panel edges.

R24.2.3 Calculation of immediate deflections

R24.2.3.1 For calculation of immediate deflections of uncracked prismatic members, the usual methods or formulas for elastic deflections may be used with a constant value of $E_c I_g$ along the length of the member. However, if the member is expected to crack at one or more sections, or if its depth varies along the span, a more rigorous calculation becomes necessary.

R24.2.3.3 The calculation of deflections for two-way slabs is challenging even if linear elastic behavior can be assumed. For immediate deflections, the values of E_c and I_e specified in 24.2.3.4 and 24.2.3.5, respectively, may be used (ACI 209R). However, other procedures and other values of the stiffness $E_c I_e$ may be used if they result in predictions of deflection in reasonable agreement with the results of comprehensive tests.