Like AISC Design Guide No. 3, ASCE 7 suggests that damage to non-loadbearing partitions may occur if vertical deflections exceed about $^3/_8$ in, unless special detailing is used. Otherwise, ASCE 7 does not cover the complexities of specifying vertical deflection criteria in metal roofs.

Which vertical deflection criteria do we recommend? In our opinion, the *L*/150 criterion is too liberal for finished spaces. For a typical 25-ft span, it translates into a 2-in deflection under the design snow loading—a noticeable sag that may alarm occupants. We also feel that in northern climates this criterion should not be used even for roofs without ceilings but with very low slopes, to avoid ice accumulation near the eaves. The traditional *L*360 and *L*240 deflection criteria for plastered and nonplastered ceilings, respectively, should be adequate for most finished spaces.

As shown in Sec. 11.3.1, the vertical deflection limit of *L*/240 should be appropriate even for metal roofs without ceilings, if the roof slope is very low and/or the building is located in a northern region. Moreover, using this limit increases the value of the building by allowing finishing it later without incident.

For buildings in which all three following conditions are met, the *L*/180 limit might be acceptable: (*a*) snow load does not control the design, (*b*) the roof slope exceeds $^1/_2$:12, and (*c*) future ceiling installation is extremely unlikely. To avoid any misunderstanding with present and future owners, it might be a good idea to advise the owners in writing that the building design does not allow for any future roof-hung ceiling installation, unless the future designers use special detailing to accommodate vertical deflections.

We should note that the deflection limit of either *L*/240 or *L*/180 is more stringent than the standards of most manufacturers: some still design the purlins for a limit of *L*/120 under snow or live load. If desired, the stringent deflection limits (and those for lateral drift) must be specified in the contract documents and verified by reviewing the manufacturer's submittals.

REFERENCES

1. *International Building Code,* International Code Council, Falls Church, VA, 2000.
2. *Uniform Building Code,* International Conference of Building Officials, Whittier, CA, 1997.
3. *The BOCA National Building Code,* Building Officials & Code Administrators International, Country Club Hills, IL, 1999.
4. *Standard Building Code,* Southern Building Code Congress International, Birmingham, AL, 1996.
5. "Wind Bracing in Steel Buildings," Final Report, Subcommittee 31, Committee on Steel, Structural Division, *Transactions ASCE,* vol. 105, pp. 1713–1739, 1940.
6. Edwin H. Gaylord, Jr., Charles N. Gaylord, and James. E. Stallmeyer (eds.), *Structural Engineering Handbook,* 4th ed., pp. 25–28, McGraw-Hill, New York, 1997.
7. Richard N. White and Charles G. Salmon (eds.), *Building Structural Design Handbook,* p. 583, Wiley, New York, 1987.
8. "Wind Drift Design of Steel-Framed Buildings: State-of-the-Art Report," by ASCE Task Committee on Drift Control of Steel Building Structures of the Committee on Design of Steel Building Structures, *ASCE Journal of Structural Engineering,* vol. 114, no. 9, September 1988.
9. Minimum Design Loads for Buildings and Other Structures, ASCE 7-98, American Society of Civil Engineers, New York, 1998.
10. *Serviceability Design Considerations for Low-Rise Buildings,* Steel Design Guide Series No. 3, AISC, Chicago, IL, 1990.
11. Theodore V. Galambos and Bruce Ellingwood, "Serviceability Limit States: Deflection," *ASCE Journal of Structural Engineering,* vol. 112, no. 1, January 1986.
12. *Metal Building Systems Manual,* MBMA, Cleveland, OH, 2002.
13. John L. Ruddy, "Evaluation of Structural Concepts for Buildings: Low-Rise Buildings," BSCE/ASCE Structural Group Lecture Series at MIT, Cambridge, MA, 1985.
14. Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design, AISC, Chicago, IL, 1989.

REVIEW QUESTIONS

1 Explain the differences between story drift, horizontal wall deflection, and vertical deflection.

2 Why have the building codes historically avoided prescribing drift limits for buildings under wind loading?

3 Name at least two kinds of exterior wall materials that could be considered pinned at the base.

4 What are the dangers in using liberal vertical deflection criteria for buildings with suspended ceilings located in the snow regions?

5 What is the lateral drift limit recommended by AISC Design Guide No. 3 for buildings with interior partitions attached to the frame? What wind loading should be used to compute the drift?

6 Can a reinforced wall of concrete masonry units (CMU) doweled at the base into the foundation wall be considered pinned at the bottom? Explain why or why not.

7 Explain the potential problem of specifying a vertical deflection limit of an L/150 for a building located in a snow region, with a structural-type metal roof having a pitch of 1/4:12.