of obtaining prequalification of new systems, materials, or components for broad application.

Some industries and industry standards have adopted standard protocols and procedures for qualification testing. For example, AISC 341, Appendix S, specifies the required testing for qualification of connections used in certain steel seismic force resisting systems. The wood structural panel industry has generally embraced the testing protocols developed by the Consortium of Universities for Research in Earthquake Engineering project (Krawinkler et al. 2002). When a material, component, or system is similar to those for which such an industry standard exists, the industry standard should be used, unless it can be demonstrated to the satisfaction of the Peer Review and Authority Having Jurisdiction that more appropriate results will be attained by using alternative procedures and protocols.

C1.3.2 Serviceability

In addition to strength limit states, buildings and other structures must also satisfy serviceability limit states that define functional performance and behavior under load and include such items as deflection and vibration. In the United States, strength limit states have traditionally been specified in building codes because they control the safety of the structure. Serviceability limit states, on the other hand, are usually noncatastrophic, define a level of quality of the structure or element, and are a matter of judgment as to their application. Serviceability limit states involve the perceptions and expectations of the owner or user and are a contractual matter between the owner or user and the designer and builder. It is for these reasons, and because the benefits are often subjective and difficult to define or quantify, that serviceability limit states for the most part are not included within the model United States Building Codes. The fact that serviceability limit states are usually not codified should not diminish their importance. Exceeding a serviceability limit state in a building or other structure usually means that its function is disrupted or impaired because of local minor damage or deterioration or because of occupant discomfort or annoyance.

C1.3.3 Self-Straining Forces

Constrained structures that experience dimensional changes develop self-straining forces. Examples include moments in rigid frames that undergo differential foundation settlements and shears in bearing walls that support concrete slabs that shrink. Unless provisions are made for self-straining forces, stresses in structural elements, either alone or in combination with stresses from external loads, can be high enough to cause structural distress.

In many cases, the magnitude of self-straining forces can be anticipated by analyses of expected shrinkage, temperature fluctuations, foundation movement, and so forth. However, it is not always practical to calculate the magnitude of self-straining forces. Designers often provide for self-straining forces by specifying relief joints, suitable framing systems, or other details to minimize the effects of self-straining forces.

This section of the standard is not intended to require the designer to provide for self-straining forces that cannot be anticipated during design. An example is settlement resulting from future adjacent excavation.

C1.4 GENERAL STRUCTURAL INTEGRITY

Sections 1.4.1 through 1.4.4 present minimum strength criteria intended to ensure that all structures are provided with minimum interconnectivity of their elements and that a complete lateral force-resisting system is present with sufficient strength to provide for stability under gravity loads and nominal lateral forces that are independent of design wind, seismic, or other anticipated loads. Conformance with these criteria will provide structural integrity for normal service and minor unanticipated events that may reasonably be expected to occur throughout their lifetimes. For many structures, housing large numbers of persons, or which house functions necessary to protect the public safety or occupancies that may be the subject of intentional sabotage or attack, more rigorous protection should be incorporated into designs than provided by these sections. For such structures, additional precautions can and should be taken in the design of structures to limit the effects of local collapse and to prevent or minimize progressive collapse in accordance with the procedures of Section 2.5, as charged by Section 1.4.5. Progressive collapse is defined as the spread of an initial local failure from element to element, resulting eventually in the collapse of an entire structure or a disproportionately large part of it.

Some authors have defined resistance to progressive collapse to be the ability of a structure to accommodate, with only local failure, the notional removal of any single structural member. Aside from the possibility of further damage that uncontrolled debris from the failed member may cause, it appears