

Calibration to Target Safety

One way of deciding whether a design is suitable is to ask if it meets a target safety level, i.e., a pre-defined probability of failure, p_f . The failure probability is often expressed in terms of the reliability index, β . The relationship between the failure probability and the reliability index is explained elsewhere on this website and for structures considered by civil engineers the target reliability index is usually in the range from 3.0 to 4.5.

While the calibration of a design to a target safety level is common, and sometimes referred to as reliability-based design, it is not ideal. A better approach is to express the costs and benefits associated with different design alternatives. In turn, a decision principle, such as expected cost, will determine the optimal safety level. For example, a simple one-storey garage with little consequence of failure should have a lower safety level than, say, a hospital building.