

# Top 10 design mistakes

## Roofing professionals share the most common roof system design mistakes they see in the field

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Dane Bradford

Following are my Top 10 design mistakes (in no particular order):

1. *Specifying a roof system simply because it worked on another building.* This could be the most common mistake made by designers. All too often, I see specifications that simply are a reprint of the same specification a designer has used on the past 20 buildings he designed. A review of *The NRCA Roofing and Waterproofing Manual, Fifth Edition*, will indicate a thorough consideration of criteria such as a building's structural and architectural components, location, height and interior usage, among many others, plays a part in the development of a roof system specification that will provide satisfactory performance. The reality is that there is no such thing as a panacea in the roofing industry.
2. *Designing a roof drainage system that does not recognize water runs downhill.* In virtually every case, a roof system will perform better when it does not pond water. The most common situation when ponded water occurs is when a structure is sloped and the low point of a roof deck rests on structural members. In most cases, this will not allow for drains to be installed at the low point of a roof deck. Even a minimal offset of drains can become a nightmare of ponded water, pointed fingers and unhappy customers. By keeping in mind from the outset that water runs downhill, designers and contractors can make appropriate decisions concerning drainage before construction begins.
3. *Not designing a roof system and related details with future roof system replacement in mind.* With few exceptions, roof systems need to be replaced at some point during buildings' lives. During initial design and detailing, consideration should be made as to the installed heights of penetration curbs; access doors; conduit lines and gas lines; heating, ventilating and air-conditioning units; and counterflashings, cap flashings and through-wall flashings. These considerations can make the difference between a relatively low-cost reroofing project and one that involves needless and expensive disconnection and reconnection of units and duct work, rebuilding or extending existing curbs, and involvement of cranes or other equipment to lift units that will not allow for additional insulation or system changes during a reroofing project.

4. *Using UL and FM standards as a catch-all without understanding them or their effects.* As valid as a UL Class A or an FM 1-90 rating may be, they have, in many designers' specifications, become default standards that often have little or nothing to do with satisfactory performance of a chosen roof system. Certainly, the ease of understanding the supporting information for these standards can be difficult, but thoroughly understanding them is essential to overall system performance, as well as code conformance and cost effectiveness of a finished roof system.
5. *Specifying insulation based on unrealistic R-values.* The ongoing discrepancies in accepted R-values between those published by insulation manufacturers and those accepted by groups such as NRCA have posed difficulties for designers for years. The term "design mistake" may put too much onus on the designer in this situation. The continuing disagreement about what should be an acceptable aged R-value for polyisocyanurate insulation results in confusion of designers, frustration of roofing contractors and potential energy inefficiencies in mechanical system designs that are not only costly to the owner but potentially can lead to legal difficulties for designers and contractors.
6. *Specifying roof systems that do not meet local building code requirements.* Most designers are quite conscious of the fact that building codes need to be followed and try hard to follow these requirements. However, the disconnect that often occurs is in translating specific code requirements to a specific roof system and the related standards the codes reference or require. In short, this adds one more layer of confusion to the already confusing situation described in my fourth concern. Add to this the innumerable permutations of codes that can occur in a municipality or state where a designer performs work, and you can see the potential for mistakes to be made.
7. *Specifying a roof system based solely on a manufacturer's warranty.* Designers, owners and roofing contractors need to remember manufacturer warranties are, for the most part, a list of exclusions that limit a manufacturer's liability in case of a claim. To specify a roof system simply based on a 10-, 15- or 20-year warranty ignores this reality. Designers need to remember a piece of paper does not keep water out of buildings. (See my 10th concern.)
8. *Specifying the "newest" material on the market.* The innovation that the manufacturing community shows year after year in developing new systems and accessories is admirable and is what makes U.S. business great. However, in most cases, a successfully performing roof system often exists as a result of trial and error. Most people would have a difficult time identifying a successful material or system that hasn't been changed or improved in some way as a result of in-place performance issues. Unfortunately, in a few cases, products or systems are introduced and marketed to designers who have a penchant for specifying the "newest" thing on the market. Although this is not necessarily a wrong approach, it certainly increases the potential for problems and liability.

9. *Not requiring cover boards over polyisocyanurate insulation.* For at least the past 20 years, NRCA has recommended the use of cover boards over foamed plastic insulation to prevent a myriad of potential problems and improve overall roof system performance. The evidence—*anecdotal and empirical*—continues to prove these recommendations are valid. From a technical and practical standpoint, the benefits continue to far outweigh the marginally higher installed cost that will result from inclusion of a proper cover board.

10. *Not requiring an ongoing maintenance program as part of specifications.*

Conventional wisdom has been that three things are needed to make a roof system perform well: good design, good materials and good workmanship. However, all roofing industry segments recently have realized that though each of these is important to achieve long-term roof system performance, one thing is missing—*maintenance*. The one group that has failed in many cases to embrace this concept is the design community because of the overreliance on manufacturer warranties and misunderstanding of what they cover. Roof system designers need to understand that virtually all warranties specifically limit coverage in case a building owner does not perform regular maintenance on a roof system. Provisions for maintenance services need to be made in specifications during initial design of a roof system.