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## chapter 14. FASTENINGS

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In construction there are more types of fastenings than are imaginable. We will not discuss proprietary ones except when we have seen problems. Nor shall we deal with bolts or other heavily engineered fastenings. Our comments are limited to nails and staples.

### 14.1 NAILS

Probably the most underrated fastening we have is the nail. Properly installed, nails have tremendous durability and redundancy. However, there are a few major considerations.

- Some fire-retardant treatments of wood are hygroscopic and generally require stainless steel or monel fastenings, an important consideration if the building will be in a humid environment. Fire-retardant treatment producers will advise regarding the hygroscopicity and corrosion characteristics of their treatments.
- Heavily polluted environments will probably need special care.
- Nail materials
  1. *Bright steel*: Strong and durable except in humid or wet conditions. Rusts quickly and progressively.
  2. *Electroplate galvanized*: Fine for concealed locations or dry environments. Of no value in humid or wet conditions. Rusting does not occur as fast as with bright steel, but almost.
  3. *Hot-dip galvanized*: Good for moderate exposure to moisture. Will not provide adequate performance under salt-laden conditions or in extremely wet areas. The galvanizing coating is porous and rust can occur under the coating. Generally not a structural problem (except in salt-spray conditions), but will cause staining.
  4. *Aluminum*: Highly resistant to most wet conditions except salt-laden atmospheres. Not recommended in sun-exposed conditions, because the high-thermal expansion properties of the metal causes the nails to back out of the wood. We suspect ringed tips (not shanks) would reduce this problem, but have seen no tests or field data to support this assumption. If they are not protected by a finish coating, under severe conditions aluminum nails will cause some staining of most woods used as siding.
  5. *Stainless steel*: The ultimate nail under most conditions. It will, however, stain most wood siding under severe condi-

tions unless protected by a finish coating. Also, we have seen many installations of small-diameter, short stainless steel nails used with some of the new thin siding. These nails back out of the wood rapidly. Do not use without 1-1/2 inch of penetration into the framing members. Again, we - suspect the new ring tips (not shanks) will reduce this problem, but we lack data.

6. *Tee nails*: These gun-driven nails have little value, in our opinion, except that they are cheap. We do not like them, and they should never be used with the head parallel to the grain of wood.

## 14.2 STAPLES

Staples are becoming more popular for shingles, shakes, and siding. Staples may be satisfactory with shingles or shakes when used properly, but wood siding manufacturers associations are strongly opposed to their use. Conclusions about their long-term performance are still tentative. In the interim, we recommend the following:

- Use only stainless-steel or monel staples. The wire diameter of a staple is simply so small that any rusting or other corrosion can lead to failure. Galvanizing is not adequate; it does not cover individual staples completely and may be damaged in driving.
- Staples should be used only with crowns across the grain. When applied parallel to the grain, their cutting properties are simply too great and the crowns may pull through the wood. Overdriving is common, even with the crowns perpendicular to the grain, and contributes further to this problem. Staple guns should have a positive stop to prevent overdriving.
- The thermal expansion withdrawal properties are, to our knowledge, not yet fully known. The authors are unaware of problems but also lack information on long-term performance. Accordingly, the designer should carefully check with the individual manufacturer to establish the requirements for proper embedment into the framing.
- Staples must be driven perpendicular to the surface. Otherwise, the legs may deflect off the undersurface rather than penetrate it.