A Contractor's Guide to Carpeting

by Ken Smith

Understanding how your carpet sub works can help you ensure a trouble-free installation

S & S MILLS

Despite the popularity of carpet as a finished flooring material, few builders know much about its characteristics or the way it should be installed. A good-looking, long-wearing carpeted floor depends as much on the prep work and planning done by the carpenters as it does on the skills of the carpet mechanic. Even if you never touch a piece of carpet yourself, it's worth knowing what your subcontractor is up against so you can help make the job more trouble-free.

Estimating Carpet

Carpet is measured in square yards, but the manufactured sizes are more important in determining how much material you'll need. Although different face constructions result in different manufactured sizes (see "What's Underfoot," page 32), the standard width for American-made commercial carpet is 12 feet 1 inch, and 11 feet 11 inches for residential carpet, although both are referred to as "12-foot goods." European carpet is either 13 feet 2 inches or 13 feet 6 inches wide. One American manufacturer — Galaxy — makes a 15-foot-wide roll.

Trimmed width. Everybody assumes that a 12-foot roll will work in a room 12 feet wide, but it won't. For one thing, the finished size, or "trimmed width," of carpet is at least one inch shorter than its nominal width. In a 12x12 room, even if you subtract the dimensions of the drywall and baseboard, you won't have anywhere near the 3 inches of extra carpet most carpet layers like to have so they can lay 1½ inches up on each baseboard and trim it.

But the real problem is that everyone forgets that the space under the door adds to the room's dimensions. If the door swings out, or if there are doors on opposite walls, a 12-foot roll of carpet just won't make it and you'll have to use a seam somewhere.

Seams. You should always seam carpet along its length (see Figure 1). The manufacturing process causes all of the fibers in a carpet to lay in the same direction, and if you seam carpet across its width, it's harder to hide this "grain." Carpet also stretches better lengthwise than it does across its width. In fact, all carpet has arrows imprinted on the backing to show which way to stretch it.

One reason seams are noticeable is because the hot-melt tape backing keeps the seamed edges from stretching as much as the rest of the carpet. This creates a high spot. I use 6-inch-wide tape (3 inches wide is standard) because it makes the seam lie flat. Deep pile or berber carpets hide seams better than short fiber goods, and a carpet with a pad hides seams better than carpet glued directly to the subfloor.

Keep seams out of traffic areas where they will be more visible after the fibers are compressed. Closets are a good place to put seams, since they don't get a lot of traffic and closet doors are closed most of the time. If you need to seam a hallway, place the seam parallel to the length of the hall to avoid several short cross seams. Also make sure light from a window shines with the seam, not across it.

Rooms with built-ins. If you're figuring carpet quantities for a kitchen or bath, subtract the depth of base cabinets if they run along the entire length of a wall, but be sure to include the kick space in your dimensions. If there's any break at all in the base cabinets, use the total room width rather than create a seam. Never subtract yardage for an island or peninsula.

Stairs. The width of the stairs and whether the stringers are open or closed determine how many lengthwise strips you'll need to cut out of a 12-foot-wide roll of carpet and how long each strip should be. For example, for a 35-inch-wide stair with boxed stringers, you can cut four 3-foot-wide strips from your carpet length. This uses less carpet and generates much less waste than a 37-inch-wide stair or a stair with open stringers.

Subfloor Preparation

Improperly installed subflooring can create problems with carpeting. Carpet should be laid on 3/4-inch tongue-and-groove plywood that has been glued and screwed to the framing. Stagger the joints so that you never have four corners coming together in one place. For a better finished product, install 1/4-inch or 3/8-inch plywood underlayment over the subfloor, making sure to stagger the joints and to offset them from the joints in the subfloor.

You can lay carpet with pad directly over hardwood flooring if the joints between strips are no bigger than 1/2 inch. More importantly, the flooring should be well-nailed and flat. It's also okay to carpet right over vinyl flooring, as long as it's tightly glued. Bubbles and loose edges in the vinyl, however, will affect the way the carpet looks, and may make annoying sounds when someone walks over them.

It's difficult to make repairs to flooring or underlayment after the carpet has been laid unless you can get at it from underneath. I tell contractors to call me if they have a problem and I will pull the carpet up in the affected area. Carpet continues to stretch after it's installed, so there's usually enough slack to allow me to stretch it back into place.

If you ever have to drill or screw into the subfloor without removing the carpet, be careful not to unravel the carpet. Even a slow-moving drill bit can yank a 10-foot pull in a piece of carpet almost instantly. A carpenter I know solves the problem by inserting a 1/2-inch copper coupling into a small X-shaped cut made in the carpet. After drilling through this protective sleeve, he dabs some white glue onto the carpet backing and smooths it back into place.

Transitions

Different types of flooring are usually installed in such a way that the finished flooring height is the same throughout the building. This is also true with carpet. The subfloor under the carpet should be about 1/2 inch below the finished height of solid flooring like tile or hardwood. Since most carpet with pad lays up at about 3/4 inch and compresses with wear, it will end up flush with the adjacent flooring. Direct glue-down carpet doesn't compress as much, however, so your measurements need to be more exact. Fortunately, the short fibers used in most carpet designed for gluing can be measured easily, as long as you have a sample handy.

I don't like to use metal trim strips at transitions from carpet to other flooring materials. They work fine, but I prefer the look of a wood threshold. Thresholds also work well where two different types of carpet meet, such as in a doorway. If you don't use a threshold, at least make sure the joint between the carpets falls under the centerline of the door when it's closed.

Carpet and Indoor Air Quality

Most new carpet has a distinctive odor that lasts for a few days after installation. The possible health effects of this off-gassing have recently become the subject of some debate. In an August 1992 press release, Anderson Laboratories of Dedham, Mass., described the results of tests in which laboratory mice were exposed to warmed air after it passed over carpet samples, varying in age from one month to seven years from time of purchase. Roughly 25% of the mice died and those that survived displayed neurological abnormalities, including changes in respiratory rate and motor activity. Two CBS television programs aired in October used the test results to bring national attention to the issue.

Several organizations, including the Environmental Protection Agency (EPA), the American Industrial Hygiene Association, the Consumer Product Safety Commission, and the Carpet and Rug Institute (CRI), questioned the validity of Anderson's tests, claiming that the harmful effects on the mice could have been caused from chemicals used to clean the carpets, or other contaminants not related to carpet manufacture. They also question the test method itself, which heats the carpet to artificially high temperatures to simulate long-term exposure. Dr. Yves Alarie, the professor of toxicology at the University of Pittsburgh School of Public Health who originally established the test procedure 25 years ago, is investigating the possibility that temperatures above 37°C (98°F) may cause chemical reactions and release fumes that would otherwise not escape. On the other hand, Mark Goldman, General Manager of Anderson Laboratory, notes that the heat source — a hardware-store variety bed pad — is not in contact with the carpet and only a small portion of the adhesive is close enough to the hottest surface of the teflon test aparatus to be affected.

Anderson's tests have since been replicated, both by Dr. Alarie and by the EPA. All of the parties involved in the controversy agree that some chemicals released by carpet can cause throat, skin, and respiratory irritation in some people, but there is no agreement on the source of the adverse health effects or whether the general population is at risk. The prime suspect is 4-PC (4-phenylcyclohexene), a contaminant present in the coating on carpet backing, but other chemicals in the carpet may be responsible. Dr. Alarie is also modifying his test apparatus to address concerns about the heating of the carpet adhesive.

The effect of carpet on indoor air quality first gained national attention in 1988, when the EPA replaced some 20,000 square feet of carpet in its Washington, D.C., office complex after employees complained of health problems. CRI responded by launching its "Green Tag" program in July 1992 which, according to CRI's brochure, aims to place a green label on the back of new carpet with information that will "help customers make informed buying decisions about carpet." The brochure makes several recommendations, including unrolling carpet and allowing it to "rest" in a well-ventilated area for a few days before installation, and ventilating rooms that contain newly laid carpet for up to 72 hours after installation. CRI also recommends that people with allergies or other sensitivities to chemicals avoid the area while carpet is being removed or installed. Their maintenance guidelines suggest that carpet be vacuumed at least twice weekly and professionally cleaned at least once every 12 to 18 months with good ventilation during the process and for at least 24 hours afterwards.

Some health advocates believe these recommendations don't go far enough. Responding to complaints from the public about throat irritation, allergies, and respiratory problems that may have been caused by chemicals in carpet, attorney generals from 26 states have petitioned the Consumer Products Safety Commission to require carpet manufacturers to place warning labels on carpet and to create a consumer hotline to handle questions and complaints. So far, CPSC has refused, citing lack of direct evidence linking chemicals used to manufacture carpets to health problems.

— *Sal Alfano*

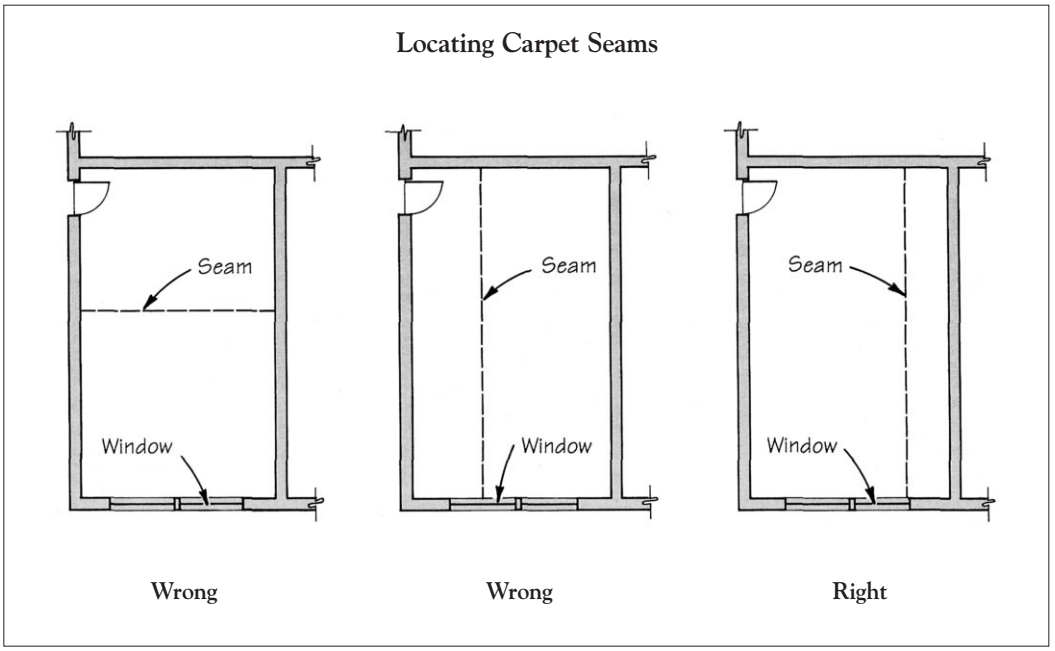


Figure 1. *Seams in carpet should always run with the length of the room and parallel to light coming from windows. Keep seams away from doors and other traffic areas since seams usually become more visible as carpet wears.*

What's Underfoot?

A carpet's face construction is named for the method used to attach the yarn to the backing. The three most common face constructions are fusion-bonded, woven, and tufted.

Fusion-bonded. The construction method that yields the most dense face is fusion-bonding. The yarn is heat-fused between two sheets of backing material, and then cut into two pieces. This always results in a cut pile (see illustration below), and may also cause color variations unless "top" and "bottom" sheets are sorted and used separately.

Woven. Originally, all carpets were woven, but today the process is too slow and expensive to adequately serve the mass market. The dimensional stability and durability of woven carpet, however, is still attractive to the specialty market. Woven carpet has either cut or loop pile.

Tufted. Almost all tufted carpet is manufactured on a broadloom — a large, fast "sewing machine" that simultaneously inserts hundreds of rows of yarn tufts through a backing material (usually polypropylene). The backing is then coated with latex and a secondary backing is glued on to provide dimensional stability. Tufted carpet also has either a cut or loop pile.

Fibers

The fibers used to build the face determine a carpet's color fastness, stain resistance, resiliency (resistance to crushing), and durability.

Wool. The best fiber material is wool, and everything else is compared to this standard. Wool is very resilient — it can be stretched 30% and still recover its original dimension — and sheds water well. But it's expensive, costing from $25 per yard to as much as $100 per yard or more. It also supports fleas more than synthetic fibers do.

Nylon. The second choice is nylon, which is considered to be the most durable man-made carpet fiber. It wears well, has good resilience, and when treated, will also resist stains reasonably well. Static electricity builds up easily in nylon, however, although antistatic versions are available.

Polyester and olefin. The most colorfast and stain-resistant fibers are polyester and olefin (polypropylene). Both are good choices in a kitchen or dining room. Polyester isn't very resilient, but hybrid acrylic fibers added to so-called "traffic-control" polyester carpet improve its resilience.

Weight, Density, and Height

Several standards are commonly used to specify the quality of carpet. *Face weight* measures the weight in ounces of the face fiber in a square yard of carpet. *Pile height* describes the distance from the backing to the top of the yarn in decimal inches — .125 inch, for example. The average pile height is used for sculpted carpet. When face weight and pile height are plugged into a standard formula, they yield the *average density*, which is the weight of a square yard of carpet that is one inch thick.

Still another formula uses these calculations to arrive at the *weight density*, which can be used to determine carpet quality. The rule of thumb is: The higher the weight density, the more yarn there is to wear. The extra yarn in a carpet with a high weight density will add resiliency and cushion to the face yarn.

Carpet Pad

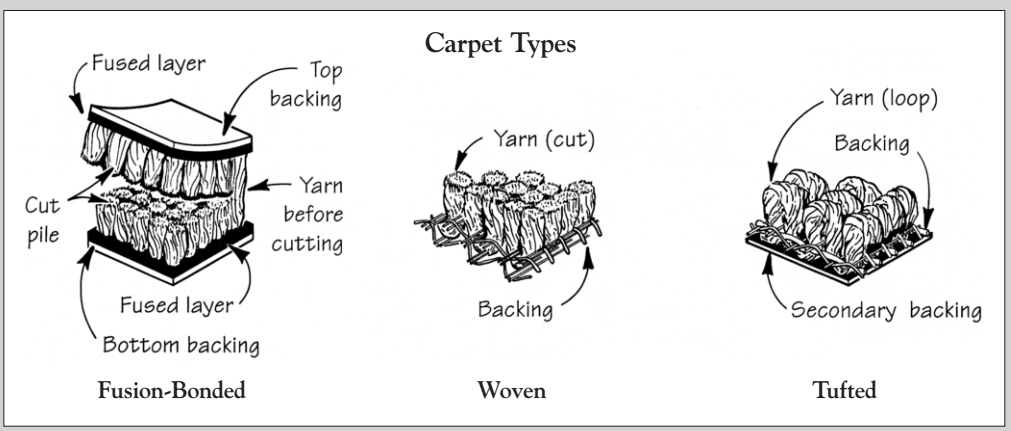
The type of pad you use under a carpet has a lot to do with how the carpet feels underfoot and how well it wears. The best pad available is made of rubber, but it costs more than $8 per square yard. Synthetic hair and jute are popular for use with commercial loop pile carpet, but again the cost is too high for most homeowners. That leaves foam pads, which come in thicknesses between 3/8 inch and 1 inch, and in three different types.

Prime urethane. The most widely used pad is prime urethane, mostly because it feels good when it's first put down and is inexpensive. But it collapses early, sometimes as soon as six months after installation.

Bonded. Recycled prime urethane pad is called "bonded" pad or "rebond." It is more durable than virgin prime urethane because added fillers increase the density. But with wear, it breaks down inconsistently, creating soft and hard spots that are likely to attract customer complaints.

Omalon. Many carpet layers agree that the best pad for residential use is Omalon, the trademarked name of a prime urethane pad manufactured by E. R. Carpenter Company (5016 Monument Ave, P.O. Box 27205, Richmond, VA 23261; 804/359-0800). The cell structure of Omalon is "precollapsed" into an elliptical shape that springs back into shape much more readily than the round cell structure of conventional prime urethanes. Omalon costs more than other types of foam pads — about $5.50 per square yard compared to $3 per square yard — but it is likely to last longer. In fact, the manufacturer guarantees Omalon for the life of the original carpet and for the life of the carpet that will replace it.

— *Sal Alfano*



Fusion-bonding (left) uses heat to fuse yarn between sheets of backing, and always results in cut pile. Woven carpet (center), which can have either a cut or loop pile, is still the best, but it is expensive and time consuming to manufacture. Tufted carpet (right) can also have either cut or loop pile. It is made by stitching yarn through a backing material, coating the underside with latex, and applying a secondary backing.

Another option is to use a "duke" — an inlay made of a third type of carpet — in place of the threshold. We've done this several times, with good results.

Special Details

Several areas require special attention when laying carpet.

Balusters. How you treat stairs with balusters fastened directly to the treads depends on the kind of carpet you're installing. Deep pile carpet hides a seam well, so you can slot it to go around the balusters. But with loop pile carpet (especially berber), this can be very tricky. One way I solve the problem is to stop the carpet shy of the line of balusters, and "bind" the edge by sewing on a piece of cloth that matches the carpet color. This can be done by hand, but machine binding is more common today. Binding costs between $1 and $1.50 per linear foot, but this amount is balanced by the savings in material when using 12-foot goods for a 3-foot-wide staircase. The treads will be exposed, however, so you should use finish grade material.

Stair treads and risers. Some carpet layers claim that the easiest way to carpet a stair with boxed stringers is to use the modern-looking "waterfall" method, so named because the carpet seems to cascade down the stairs (see Figure 2). I prefer the more traditional "cap-and-band" method, which accentuates the nosing, even though it requires some gluing and a little more hand work. But my crews do a lot of cap-and-band installations and it doesn't take them much longer than a waterfall.

Both methods require a rounded nosing to reduce wear on the carpet backing, but a waterfall can require more carpet because you can create a joint only at the corner between the tread and riser. Cap-and-band uses strips of carpet, one "cap" for every tread and one "band" for every riser. The caps are installed first, working from one end of the stair to the other, then the bands are glued to the risers on the return trip.

Baseboards. Occasionally, we are asked to roll carpet up the wall into a recessed baseboard, or to run carpet up over the baseboard itself for a special effect. In both cases, we use glue and surface tacks, if necessary, to hold the carpet in place. We also use a "cove stick" in the corner to ease the stress on the carpet and make a smooth corner. Cove sticks come in both small and large radiuses, and which one you use depends on the look you're after.

Kick spaces. It's difficult but not impossible to lay carpet right up under a cabinet kick space without damaging the cabinet. One trick to help make it easier to tuck the carpet is to use two tackless strips in the kick space, and use an angled tool called an under-toe nailer, which is

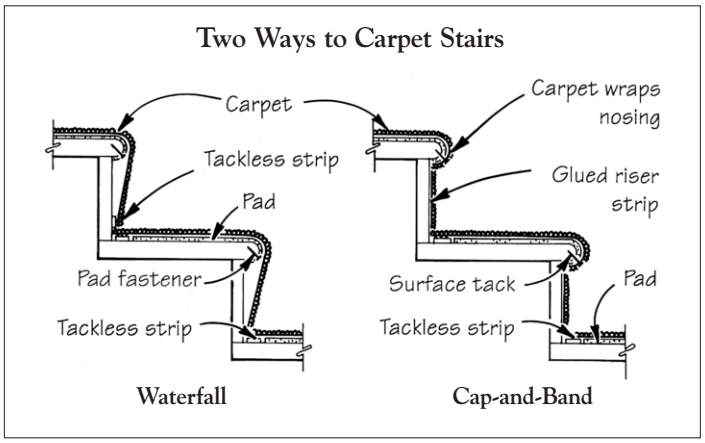


Figure 2. *There are two common methods for installing carpet on stairs. In the waterfall method (left), the carpet is attached only at the inside corner of the tread and riser. In the cap-and-band method (right), a separate cap strip is fastened to a tackless strip at the back of the tread and glued to the underside of the nosing. The band is then glued to the riser.*

also good for tucking carpet under hydronic baseboard.

Bifold doors. The bottom pivot for bifold hardware mounts to the floor, where a thick carpet and pad can complicate the installation. The easiest thing to do is to shim underneath the pivot mount with a solid block of wood and let the carpet layer work around it.

Installation

Before installing carpet I always make a map of the floor plan, showing what size carpet pieces will be needed in each room and where any seams will fall. To avoid misunderstandings, I review this map with the owners before I order the goods and we start to work.

On a commercial job, there is usually enough open area to lay the carpet out and cut it on site, but this is rarely true in residential work. We usually cut the carpet to size in the large work area at the back of my showroom, using the map as a guide. Occasionally, we also preseam the carpet in the shop, as long as it doesn't create a piece of carpet that's too big to transport to the site.

Carpet isn't particularly difficult to install, but to get a good finished product it's important to do things in the proper order. In a typical room, first fasten the tackless strip at the perimeter (with the points angled toward the wall) and staple down the pad. Then, start installing the carpet at the door, since this requires the most cutting and fitting work and often involves a transition between materials (see Figure 3). The idea is to get the carpet fastened down at one end of the room so you can stretch it toward the other end. Always stretch carpet at a 33-degree angle to its length. This creates a small wrinkle that you can work diagonally into the last corner, where it's easy to smooth out.

We use a power stretcher whenever possible for several reasons (see Figure 4). For one thing, carpet manufacturers have switched from jute backing to polypropylene, which is harder to stretch. And most manufacturers will not warrant their carpet if you stretch it manually, unless the room is 12x12 or smaller. A loose carpet wears unevenly and can even be dangerous, and you simply can't stretch carpet as tight by hand as you can with a power stretcher.

A manually operated knee-kicker is also physically demanding. I know plenty of carpet layers who have developed knee trouble because they spent years bumping carpet with a knee-kicker.

Cleanup

All carpet work is finish work. We're usually the last sub on the site, and we clean up our own mess. We always vacuum the carpet after we lay it to pick up stray fibers and fine particles. We leave any large pieces in a neat stack at the site, and haul away all scrap.

Builders complain about the way carpet scratches up the baseboard, but this is not necessarily the carpet layer's fault. Carpet backing is abrasive and will mar the finish when it's rolled up onto the baseboard before it's trimmed and tucked. I solve the problem by having my own painter touch up the trim after we're done. I always leave a note for the owners, telling them that we are aware that there are minor scratches on some of the trim and that our painter will be coming by to take care of it. Otherwise, an owner who notices scratched trim might think we were sloppy and will start looking for other problems. ■

Ken Smith owns Smitty's Flooring Specialties in Randolph, Vt.

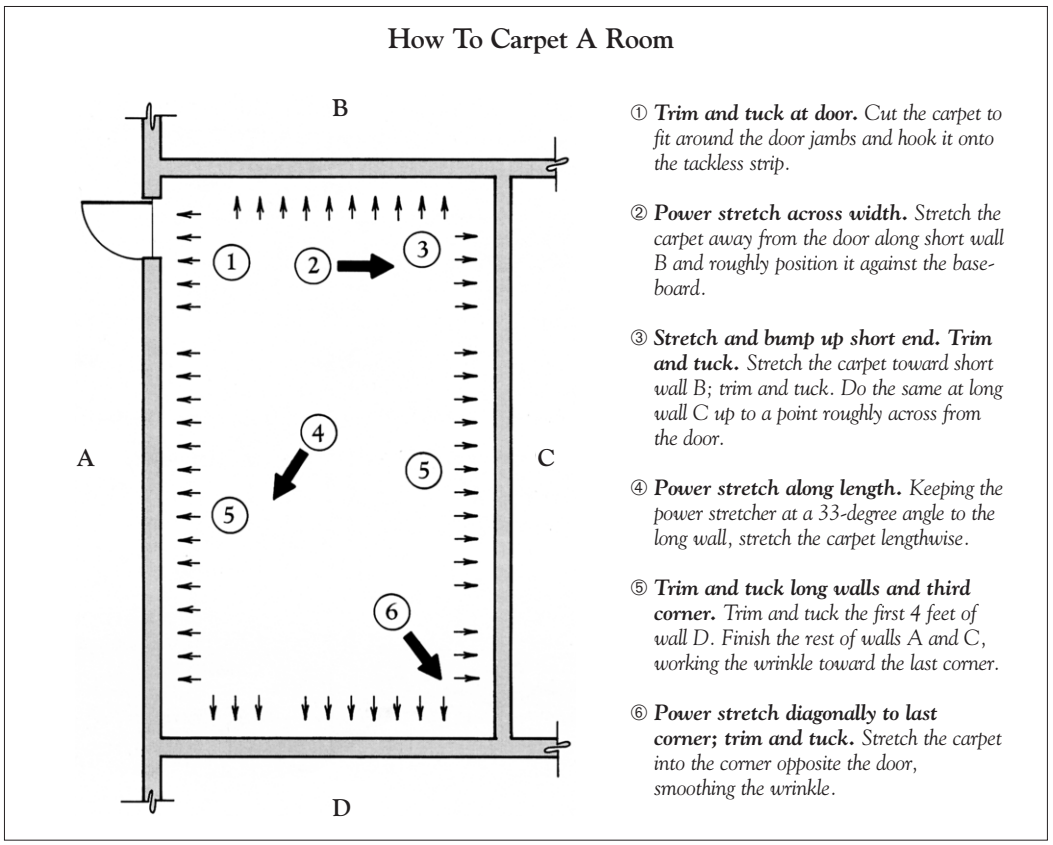


Figure 3. *Carpet layers' lingo graphically describes the order of events for carpeting a typical room.*

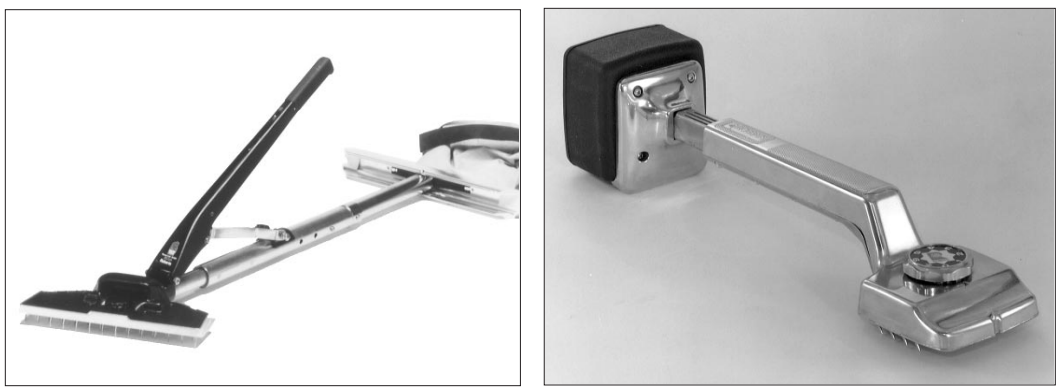


Figure 4. *Since switching from jute backing to polypropylene, which is harder to stretch, many manufacturers will not warrant their carpet for rooms larger than 12x12 unless a power stretcher (left) is used during installation. A knee-kicker (right) is commonly used for small jobs, but it can cause knee problems with repeated use.*