

**STANDARD
for
INSTALLATION of
RESIDENTIAL CARPET**

CRI 105 - 2002

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FOR
INSTALLATION OF
RESIDENTIAL CARPET**

Fourth Edition

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DISCLAIMER

The Carpet and Rug Institute assumes no responsibility and accepts no liability for the application of the principles or techniques contained in this standard. Federal, state, and local statutes, ordinances, and regulations may apply and should be reviewed. Compliance with mandatory requirements contained in the occupational Safety and Health Administration (OSHA) Hazard Communication Standard should be followed where applicable.

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FOREWORD

This manual for the installation of residential carpet is based upon reliable principles and procedures developed through practical experience, research, and information obtained from manufacturers, retailers, installers, end users, testing laboratories, and others who have specialized expertise.

This manual does not include carpet performance characteristics. For guidance in selecting and specifying carpet, review appropriate publications developed by The Carpet and Rug Institute.

Failure to follow this standard for installation shall not be the basis for rejecting a claim relating to a manufacturing defect, unless the failure to do so contributed to or caused the defect.

In addition to the standard for residential carpet installation, information in the form of recommended practices and guidelines may be found in this publication. This information, while not part of the standard itself, is presented to make the installation process a positive experience for consumers and others. Adherence to this installation standard, and the recommended guidelines in this manual will result in a higher-quality and more-acceptable installation. For specifications applicable to the installation of commercial carpet and carpet modules, please refer to CRI-104, *Standard for Installation of Commercial Carpet*.

The Carpet and Rug Institute (CRI) is the national trade association of carpet and rug manufacturers and suppliers to the industry. The expertise of CRI's membership comes together to provide unbiased technical, educational, and scientific information about carpet and rugs.

ACKNOWLEDGEMENTS

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PRACTICES RECOMMENDED FOR DEALER / RETAILER

For maximum customer satisfaction, a quality installation is required and expected by consumers. To provide a professional quality installation, there are recommended practices the retailer/dealer should follow. Some of these are:

- Employ or obtain the services of professionally trained and skilled floor covering installers.
- Make a diagram with exact measurements of the area(s) where carpet will be installed. Indicate all windows, doors, closets, and angles. Also indicate proposed seam locations and seam terminations. The estimator/measurer should initially check and list existing damage; i.e., chipped paint, scratched walls, chipped or scratched furniture, worn wallpaper, or condition of subfloor, noting any irregularities or existing damage. Indicate on the work order the type of heating system used in the structure.
- Before the job is begun, there must be agreement with the customer as to the location of all seams that may be required. Usually, seams are best laid toward the primary natural light source to minimize the visibility of “peaking.” Seams should be avoided in the pivot areas. Visibility of the seams will vary with the type of carpet purchased. Consumers should not be lead to believe seams will be invisible.
- Calculate the amount of carpet required for each location and have an exact understanding with customer. Most carpet is made in standard widths. Overages due to corners, room sizes, carpet patterns, and other factors are normal and should be explained to the customer.
- At the time of the carpet purchase, guide the customer in the selection of the appropriate type of cushion to serve specific needs. Area requirements may differ. Follow manufacturer’s recommendations for appropriate cushion for specific carpets and applications. In areas where heavy use is expected, firmer grades of cushion are recommended.
- Review with the customer the transition molding choices available, and convey to the installer the applicable selection.
- Determine who will move furniture – customer or installer. The customer may expect to pay an extra charge for this service. Have the customer move cherished or fragile items prior to the installer’s arrival. Certain items such as aquariums, pool tables, pianos, waterbeds, stereo equipment, and computers require special skills and equipment and may be outside the installer’s scope of responsibility.

- Appliances may require a utility (water, gas, etc.) disconnect. Determine in advance the local code requirements and disconnect/reconnect arrangements. This may incur additional cost. State and local codes may require licensed contractor to disconnect and reconnect appliances.
- Before any work commences, discuss who is expected to remove the existing carpet and cushion and the cost of that task. In order to comply with the Carpet and Rug Institute's recommended guidelines for improved indoor air quality, the customer should be advised that existing carpet should be vacuumed prior to removal. After removal of the carpet and cushion, the subfloor should also be vacuumed. Advise the installation contractor who is to vacuum carpet and whether or not the customer wishes to keep the old carpet or have it taken away. The customer may be expected to pay additional charges for these services. Some old carpet and cushion may be recyclable. Check with recycling centers prior to discarding in landfills. (Note: The removal of existing carpet and cushion may expose previously unforeseen substrate conditions that require remedial action, which may involve additional charges. This possibility should be discussed with the consumer prior to starting the installation.)
- Agree on an installation date. In the event that the carpet cannot be installed on the preferred date, have an alternate date in mind. Obtain a rough approximation of time required to complete the job. Notify the customer.
- Discuss with installer and customer the policy for disposal of remnant (leftover) pieces of carpet.
- Newly-installed carpet must be vacuumed, which should be performed by the installer. Vacuuming may involve an extra charge. (Note: To contain dust particles, a high-efficiency filtration vacuum cleaner is preferred.)
- Review the guarantee-warranty. It is important that there is an understanding of the guarantee/warranty – what is covered and not covered – and the procedure if a service call is required.
- As with most new products, new carpet may initially have an odor. This is normal, and should be discussed with the customer. Adhesives or hot melt seaming tapes used to install the carpet may have an odor while they are curing.
As with any renovation project, all removal or installation processes should be conducted under optimum fresh air ventilation conditions. (Note: If any occupants are sensitive to certain odors, they may wish to be absent during the installation period. Refer to "Guidelines for Good Indoor Air Quality During the Installation Process" in this publication.

PRACTICES RECOMMENDED FOR INSTALLATION CONTRACTORS AND INSTALLERS

Qualified installation personnel strive to accomplish a professional quality installation by following these practices:

- Obtain and review a detailed drawing of the area(s) where the carpet will be installed, showing the location of all seams, edge molding, etc., and resolve any questions before going to the jobsite.
Check before going to the job that the carpet, cushion, and other supplies are consistent with the work order.
- **Be on time, be neat, respect the customer, be courteous, and try not to be a salesperson on the job.**
- Refer customer's questions about the quality of the materials or scope of work to the retailer. Never discuss with the customer how difficult the carpet may be to install
- If a manufacturing defect is suspected, immediately contact the retailer.
- If required by the work order to move furniture, do it carefully. If appliances, such as stoves and refrigerators connected to gas or water lines are to be moved, state and local codes may require licensing and/or insurance. The customer should be advised that these appliances must be removed prior to the arrival of the installer.
- The person responsible for estimating and measuring should initially check and list existing damage; i.e., chipped paint, scratched walls, chipped or scratched furniture, or worn wallpaper. Upon arrival at the customer's home, the installer should recheck. Discuss the existence of damage before and after the job with the customer. If customer is not present, a list should be kept.
- Confirm with the customer the location of seams as indicated on the drawing previously agreed to by the customer and the dealer. Most locations require that seams run toward the primary natural light source, with some notable exceptions, such as high-traffic areas and doorways. If the initially-agreed-upon seam locations appear to be unacceptable to the customer, call the retailer. Customer understanding and approval of seam locations is essential to customer satisfaction.

- If the installer receives and stores the carpet, responsibility for proper storage, unwrapping, ventilating, and conditioning is assumed by the installer.
- If the customer expresses sensitivity to odors, refer to “Guidelines for Good Indoor Air Quality During the Installation Process” of this publication.
- Vacuuming the newly installed carpet may reveal minor irregularities that can be easily corrected, preventing a callback.
- Invite the customer to inspect the completed installation.

GUIDELINES FOR RESPONSIBILITIES

Manufacturer Responsibility

- Be accountable for providing first quality, installable merchandise.
- If merchandise is shipped with obvious defects, the manufacturer will be responsible for payment of reasonable and substantiated costs incurred by the dealer/retailer/installer; however, if obviously defective merchandise is installed, the manufacturer reserves the right not to pay total installation or other associated costs.
- Provide essential, product-specific installation information on sample labels and roll inserts when applicable.
- Establish and meet deviation limits for patterned carpet, defining acceptable tolerances for bow, skew, trueness of edge, and pattern elongation.
- Provide and honor warranties that do not create unrealistic consumer expectations.

Installer Responsibility

- Provide a quality installation in accordance with the CRI Standard.
- Review with the dealer/retailer and customer the detailed drawing and installation requirements of the job to attain an accurate understanding prior to commencing with the installation.
- Comply with Occupational Safety and Health Administration (OSHA) or State OSHA requirements as applicable.
- Make every reasonable effort to prevent the installation of visibly defective carpet without appropriate authorization.

Dealer/Retailer Responsibility

- Provide products suitable for the intended use, and make every reasonable effort to prevent the installation of visibly defective merchandise.
- Accurately represent to the customer in writing the quality classification as provided by the manufacturer.

- When providing installation services, manage the process by only utilizing the services of skilled personnel who have demonstrated their understanding of this document.
- Provide correct measurements to the installer. Provide a detailed diagram that shows desired seam locations, as well as all information pertinent to the job, including a cut list.

Builder/General Contractor Responsibility

- Provide an acceptable substrate for the specified installation.
- Concrete that is intended to receive a bonded overlay (carpet installed with an adhesive) must be placed, cured, finished in accordance with ACI (American Concrete Institute) standards, and tested to determine the moisture emission rate and surface pH prior to the arrival of the carpet installer. Written test reports shall be provided to the carpet installer prior to the commencement of the installation.
- Provide and maintain indoor temperatures between 65°F (18°C) to 95°F (35°C) and relative humidity below 65% in the area where carpet is to be installed. If ambient temperatures are outside these parameters, the installation of carpet must not commence until the HVAC system is operational and these conditions are maintained for at least 48 hours before, during, and 72 hours after completion.

Consumer Responsibility

- Discuss with the dealer/retailer and approve the location of all seams that may be required.
- Determine with the dealer/retailer who will move furniture and reach agreement on any charges for this service. It is recommended that cherished or fragile items be removed prior to the installer's arrival.
- Discuss with dealer/retailer the removal and disposal of the existing carpet and cushion. Determine who will perform these functions, and agree on applicable charges.
- Discuss with dealer/retailer and reach an understanding of the guarantee/warranty – what is covered/not covered – and the procedure if a service call is required.
- Vacuum old carpet prior to the arrival of installer.
- If possible, retain for future use an uninstalled swatch of carpet.

- With the installer, inspect the completed installation.
- Provide and maintain indoor temperatures between 65°F (18°C) to 95°F (35°C) and relative humidity below 65% in the area where carpet is to be installed.
- Continue operating the ventilation system at normal room temperature for up to 72 hours after installation. If possible, open doors and windows to increase the flow of fresh air.
- Maintain temperature of indoor carpet areas above 50°F (10°C), regardless of the age of the installation.

Guidelines for Good Indoor Air Quality During the Installation Process

- The consumer should always ventilate with fresh air during all phases of installation. This includes exhausting to the outside and avoiding re-circulation. Most emissions from the installation disappear quickly with adequate air exchange and ventilation.

- Vacuum the old carpet before removal to minimize the amount of dust particles.

Note: When selecting a new vacuum cleaner, look for units bearing the CRI Indoor Air Quality Program label. This label identifies vacuums that have been tested and meet minimum standards for dust containment, soil removal, and carpet appearance change.

- Vacuum the floor immediately after the old carpet and cushion have been removed.
- Continue operating the ventilation system at normal room temperature for up to 72 hours after installation. If possible, open doors and windows to increase the flow of fresh air.
- If the carpet is to be glued to the floor, use a low-emitting floor covering adhesive. Low-emitting floor covering adhesives may be identified by the CRI Adhesive Program label on the container or by contacting CRI as indicated below.
- If any occupants consider themselves to be unusually sensitive, they may wish to avoid the area or leave the premises while the old carpet is being removed and the new carpet installed.
- If possible, unroll the new carpet in a well-ventilated area for 24 hours or more before installation.



Look for and purchase carpet, carpet cushions, and floor covering installation adhesive products that display the Carpet and Rug Institute (CRI) Indoor Air Quality label. These three indoor air quality testing programs identify the products that have been tested and meet stringent indoor air quality requirements for low emissions. For further information on these programs, plus the CRI vacuum cleaner testing program, contact CRI at 800-882-8846 or visit our website at www.carpet-rug.com.

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1. Scope

This document establishes minimum industry installation standards for residential carpet.

2. Applicable Documents and References

- 2.1 *Standard for Installation of Commercial Carpet* – CRI 104 – The Carpet and Rug Institute
- 2.2 *The Carpet Primer* – The Carpet and Rug Institute
- 2.3 *How to Specify Commercial Carpet Installation* – The Carpet and Rug Institute
- 2.4 *Excellence in Action* – principles of CRI-105 in video – The Carpet and Rug Institute
- 2.5 ASTM F-1869-98 – *Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Calcium Chloride*, American Society of Testing & Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. www.astm.org

3. Tools and Materials

Carpet shall be installed using tools and materials referenced in this standard. Proper tools and quality materials are essential for skilled and proficient carpet installation.

4. Storage and Handling

Carpet must be stored and handled with care to prevent damage and to facilitate the proper installation of the product.

4.1 Storage – Carpet and related materials must be stored in a climate-controlled, dry space. Carpet must be adequately protected from dirt, dust, moisture, and other contaminants and stored on a flat surface. Stacking heavy objects on top of carpet rolls should be avoided.

4.2 Handling – Carpet shall be transported in a manner that prevents damage and distortion. Bending or folding of individual carpet rolls is not recommended.

When bending or folding is unavoidable for delivery purposes, the carpet should be unrolled and allowed to lie flat immediately upon arrival at the installation area.

4.3 Condition carpet – Carpet should be unrolled and allowed to relax prior to the commencement of installation. To facilitate relaxation, pre-cutting of carpet is recommended.

Failure to observe the preceding requirements may result in the following:

- Contamination from dirt, grease, and/or oil
- Delamination
- Permanent indentation
- The development of wrinkles and bubbles over time
- Pile reversal
- Roll-crushing
- Lack of adhesion
- Creases
- Pattern distortion

5. Measuring and Planning

All aspects of the installation should be coordinated. Correct measurements and a detailed diagram with a cut list are essential before the installation can be professionally planned, estimated, or completed.

Planning, layout, execution of work, and, especially, seam placement decisions must reflect the wishes of the consumer, be consistent with the industry standards, and should include input from the carpet dealer and installer.

5.1 Seams – Seams shall be kept to a minimum and positioned as recommended where possible.

- Seams run the length of the area.
- Main traffic runs parallel to, rather than across, the seam.
- Natural light does not strike across the seam.
- Seams are away from areas subjected to pivoting traffic.
- Seams are not perpendicular to doorway openings.

5.2 Pile direction – Where two or more pieces of the same carpet are adjacent, the pile direction shall run the same as in other areas of the room.

5.3 Layout and trimming – Carpet shall be cut in accordance with the seaming diagram, allowing at least 3 inches along each wall for trimming and sufficient material to match patterns when applicable.

5.4 Carpet selection – To ensure the desired performance, the carpet selected must be suitable for the end-use application and the intended method of

installation. In the absence of specific instructions from the manufacturer to the contrary, unitary backed carpet should not be installed over a separate cushion.

5.5 Carpet over carpet – In the absence of manufacturer’s specific recommendations to the contrary, carpet should not be installed over existing carpet.

6. Site Conditions

6.1 Floor preparation – Carpet should only be installed over properly prepared substrates that are suitable for the specific product and installation method selected.

6.1.1 Subfloor conditions – The owner or general contractor is responsible for providing an acceptable substrate for the specified installation. Subfloors must be structurally sound and free of any foreign objects that might compromise the carpet or its intended use.

Caution: Any concrete floor, even when adequately cured, can allow moisture vapor to pass through to the surface. Depending upon the type of carpet and method of installation selected, the moisture emission rate can play a critical role in the long-term success of an installation. To avoid potential problems that may occur after the building is occupied, it is strongly recommended that the owner or general contractor have the concrete tested to determine the moisture emission rate and surface pH prior to the commencement of any glue-down installation. (See 8.1.2)

Subfloors must be properly prepared with proper consideration given to the intended use and installation method specified. All cracks, holes, joints, and protrusion must be adequately addressed to ensure a smooth, finished appearance and to prevent accelerated wear.

6.2 Work sequence – Carpet should only be installed after the substantial completion of work being performed by other trades and in the absence of personnel not essential to the installation of the carpet.

Premature installation of carpet before other trades have completed their work often results in problems affecting appearance retention, visible damage, soiling, delamination, and dimensional stability. These conditions may not be immediately evident.

6.3 Temperature and humidity – Carpet shall be installed when the indoor temperature is between 65°F (18°C) to 95°F (35°C) and the humidity ranges from 10% to 65%. If ambient temperatures are outside these parameters, the installation of carpet must not commence until the HVAC system is operational and these conditions are maintained for at least 48 hours before, during, and 72 hours after completion.

6.3.1 Installed conditions – Installed carpet should not be left in uncontrolled indoor environments subject to extreme fluctuations in temperature and humidity.

Installation performed outside these temperature and humidity parameters increases the risk of voiding manufacturer warranties and incurring long-term consumer dissatisfaction as a result of:

- **Delamination of the secondary backing**
- **The development of wrinkles and buckles over time**
- **Additional costs for otherwise unnecessary re-stretches**

When adhesives are involved:

- **Prolonged cure time**
- **Poor adhesion**
- **Seam separation**
- **Separation from vertical abutments**

7. Stretch-in Installation

This method involves the installation of carpet under tension, utilizing tackstrip fastened at all walls and other vertical abutments around the perimeter of the area. A separate cushion shall be used.

7.1 Tackstrip –Tackstrip should be a minimum of 1 inch (25 mm) wide and ¼ inch (6 mm) thick. Architectural strip with 3 rows of pins, or 2 rows of conventional strip, should be used for carpet with heavily-latexed backs, most woven and Berber style carpet, and any carpet in rooms exceeding 30 feet (9 m) in length or width. To prevent possible injury to building occupants, the pins on the tackstrip should not protrude through the carpet being installed.

7.1.1 Installation of tackstrip – Tackstrip must be fastened securely around the perimeter of the area to be carpeted and at a distance of slightly less than the thickness of the selected carpet from all vertical abutments.

- Tackstrip shall be placed with the pins angled toward the vertical abutment.
- The distance between the tackstrip and vertical abutments should not exceed 3/8 inch (9 mm).
- Installation of tackstrip across door openings and/or sills should be avoided.
- Tackstrip should be cut to follow the contour of door casings and other irregularly shaped abutments.
- Carpet shall not be stapled to tackstrip.
- On radiant heated floors, do not drive nails or screws into conduit or tubing.

7.2 Separate cushion selection –The cushion must be in accordance with the carpet manufacturer’s recommendations for the specific product being installed. Failure to follow carpet manufacturer’s recommendations for cushion may result in the voiding of warranties. These recommendations may differ, depending on the

style and construction of specific carpet. The Carpet and Rug Institute and the Carpet Cushion Council recommend a maximum thickness of 7/16 inch (11mm) for carpet cushion for residential applications, but in no case should thickness exceed 1/2 inch (13mm).

Note: Tufted Berber style, woven, and heavy-latex-backed carpets usually require firm, dense cushions no thicker than 3/8 inch (9mm). Some cushions may be unsuitable for use over radiant-heated floors.

7.2.1 Installation of separate cushion – Carpet cushion should be installed in the longest continuous lengths possible, with the seams placed at right angles to the carpet seams or at least 6 inches (150 mm) to one side. Cushion shall be trimmed flush with the inside contour of the tackstrip and securely fastened to the subfloor with staples or non-flammable cushion adhesive at the seams and around the perimeter of each room. With the exception of fiber cushions, seams should also be secured with appropriate cushion tape.

7.3 Carpet seam edge preparation – All edges that are to be used for seams must be properly prepared in strict conformance with carpet manufacturer’s recommendations.

7.3.1 Trimming – Seam edges shall be trimmed using tools and techniques best suited for the carpet. Trim edges far enough into the material to maintain the structural integrity of the carpet and to join edges without gaps or overlaps.

Although “row-cutting” both edges is preferred, other trimming methods may be more suitable with some carpets. Many carpets do not lend themselves to all methods of cutting. Contact carpet manufacturers for specific recommendations.

Note: Some woven carpet selvages must not be trimmed. Follow the manufacturer’s recommendations.

7.3.2 Sealing edges – Prior to seaming together, both trimmed edges of pieces to be joined must be sealed with an appropriate adhesive. Latex seam sealer or thermoplastic are acceptable. The seam adhesive must be applied in a manner that encapsulates both the primary and secondary backings.

Note: Do not contaminate face yarn with adhesive.

Failure to properly seal seam edges often results in:

- **Edge ravel**
- **Edge delamination**
- **Tuft loss**
- **Seam separation**

7.4 Seaming – The appropriate seaming method is dependent upon the backing type and construction of the carpet. Always follow manufacturer’s recommendations for seaming. Common seaming methods include:

- Hot-melt tape
- Hand sewing
- Tape and latex
- Conductive tape

7.4.1 Proper seam characteristics – With any method, a properly constructed seam:

- Has cleanly trimmed edges properly secured with seam sealer.
- Has tightly abutted edges without gaps or overlaps.
- Maintains reasonable pattern match where applicable.
- Will not be invisible.

7.5 Power stretching – Carpet must be properly power stretched and firmly hooked onto the tackstrip in accordance with the seven-step procedure described in *Figure 1*. **The use of a power stretcher is mandatory.** Devices used as a substitute for, or an attachment to, a power stretcher may cause injury, damage carpet or subfloors, or result in an inadequate amount of stretch and are not acceptable.

Failure to power stretch a carpet may result in:

- **Wrinkling and buckling over time**
- **Localized damage to the carpet**
- **Delamination**

Note: For patterned carpet, care must be exercised to ensure pattern alignment along walls. The use of a power stretcher, stay-nails, and a “dead man” may be necessary to achieve proper pattern match at seams and alignment along walls.

7.5.1 Amount of stretch – Due to the diversity of carpet backings available, the carpet manufacturer’s recommendations for the amount of stretch to be applied should be followed. In the absence of specific recommendations, tufted carpet with synthetic backing should be stretched 1% to 1½% in length and in width.

Note: Slightly less stretch applied in the width as compared to carpet length stretch will usually lessen seam-peaking tendencies.

CAUTION: Wrinkling and buckling are most often caused by the failure to adequately stretch the carpet using a power stretcher, the use of an inappropriate cushion, adverse temperature and humidity conditions, or inadequate conditioning time.

7.6 Finishing at wall line – The installation shall be finished along the wall line, leaving a smooth, neat, and secure transition. The carpet shall be trimmed without damaging baseboards or moldings, leaving sufficient material so the

backing can be securely tucked into the gully without protruding face or backing yarns.

Note: Minor scratching of surface finish on baseboards and moldings may be unavoidable during the tucking process.

7.7 Transition molding – Where carpet meets other floor coverings, the edges must be adequately protected with an appropriate transition molding.

7.7.1 Sealing – Edges placed into transitional moldings may require sealing to prevent raveling.

8. Installations Using Adhesive

Generally, there are two types of installations in which carpet is fastened to a substrate using an adhesive. These are direct glue down and double glue down. The specifics of both will be discussed in this section, but the following requirements are applicable regardless of the method chosen.

8.1 Additional subfloor requirements – Subfloors must be clean, dry, and free from joints, cracks, depressions or protrusions that will show through the finished installation or cause premature wear. The floor should be free from contaminants that may interfere with adhesion.

Carpet, when bonded with an adhesive, will follow every contour of a substrate, essentially forming a skin. Seemingly insignificant imperfections in a subfloor can become very obvious after the carpet is installed. Joints, cracks, depressions, bumps and other protrusions not properly addressed may be unsightly and cause premature wear. Dirt, dust, wax, oil, grease, moisture, and other contaminants can prevent or otherwise destroy adhesion, causing bubbles or widespread failure.

While some floor preparation is “normal,” it is not the floorcovering installer’s responsibility to correct deficiencies in the work of other tradesmen, such as carpenters and concrete finishers.

8.1.1 Patching – Patching compounds must be suitable for the end-use application, polymer fortified, and applied in accordance with the patch manufacturer’s instructions.

Note: Patched areas may be porous and highly alkaline, which may prevent adequate adhesive bond. For best results these patched areas should be primed.

8.1.2 Concrete – Concrete must be properly placed, finished, and cured. Carpet should not be installed over the residue of liquid, membrane-forming cure agents, or in the presence of other chemicals that may be detrimental to the adhesive bond. The concrete must not be excessively porous or powdery. Concrete slab surface temperature should not be less than 65°F (18°C) at time of installation.

CAUTION: Carpet installed in the presence of excessive moisture emission or alkali has a high risk of failure. Concrete, not properly placed or cured in accordance with recommended American Concrete Institute standards, may exhibit moisture emissions that exceed the tolerance of the carpet and/or adhesive selected. The determination of compliance with ACI standards, including moisture emission and pH testing, is outside the scope of responsibility of the carpet manufacturer, retailer, or installer. Some floor covering products, and installation methods, are more tolerant of moisture and alkali than others. Carpets with impermeable or non-porous backings in glue-down applications are considered the most critical. Most adhesive manufacturers require that carpet be installed **only** if the moisture emission rate as determined by the anhydrous calcium chloride test is not more than 3 lbs/1000 sq. ft./24 hours. Procedures for conducting calcium chloride vapor emission tests are outlined in ASTM F-1869-98. The presence of excessive surface alkali can destroy most floor covering adhesives. Concrete sub-floors with a pH greater than 9 requires corrective measures before carpet installation using adhesives. Moisture and alkali may have less impact on the success of carpet installations when stretched-in over separate cushion. Excessive moisture emissions in all methods of installation may result in mold and mildew growth and in indoor air quality problems.

8.1.3 Wood – Wood subfloors must be structurally sound and dry. Subfloor materials, including plywood, hardboard, strip wood, particleboard, oriented strand board, and others, must be “flooring grade” and installed in accordance with the manufacturer’s specifications. New and/or sanded wood subfloors may require the application of a primer compatible with the adhesive to provide adequate bond.

Note: Glue down installation over pressure-treated or flame-retardant wood is not recommended.

8.1.4 Metal – Metal surfaces must be coated with a primer compatible with the adhesive.

CAUTION: Adhesives applied to bare metal surfaces can cause rapid oxidation or other chemical reactions.

8.1.5 Resilient floor coverings – Carpet should not be installed using adhesives directly over resilient floor coverings that contain vinyl plasticizers, which can affect the bond. Corrective measures may include removal, the application of specifically designed primers or sealers, or cement-based embossing levelers. Some resilient tile may serve as an acceptable surface upon which to install carpet as long as it is adequately bonded to a suitable substrate in the absence of excessive moisture and alkali.

CAUTION: Many resilient floor coverings contain vinyl plasticizers. Carpet adhesives, when applied directly to these products, may soften or liquefy over time, causing widespread failure. This chemical reaction is referred to as “plasticizer migration.”

Note: Existing finishes on the tile must be removed prior to direct gluing the carpet.

CAUTION: Some resilient floor coverings and adhesives contain asbestos and must be handled, removed, and/or disposed of in accordance with local, state, and federal requirements.

8.2 Trowel notch –Selected trowel notch configuration must be in accordance with the carpet manufacturer’s recommendation or from **Table 1** of this publication.

8.3 Adhesive selection –Adhesive must be in accordance with the carpet manufacturer’s specific recommendations and applied in a manner that ensures an adequate bond throughout the life of the carpet.

8.3.1 Curing of adhesive – Foot traffic over all direct glue-down installations should be avoided for a minimum of 24 hours to allow the adhesive to adequately cure; avoid rolling traffic for a minimum of 48 hours.

CAUTION: Premature traffic can cause adhesive to migrate, causing localized bond failure. Exposure to water from cleaning or other sources must be prevented for a minimum of 30 days. Disregarding either of these precautions can result in the eventual failure of the adhesive bond.

8.4 Direct glue down – This method involves the installation of carpet, with or without an attached cushion, in direct contact with the subfloor, using an appropriate adhesive.

8.4.1 Adhesive application - the floor adhesive should be uniformly spread over the entire subfloor with the specified trowel. leaving ridges of sufficient height to achieve full and complete coverage of the carpet backing. The carpet manufacturer’s and adhesive manufacturer’s specific recommendations for adhesive transfer, method of application, and open time must be followed.

CAUTION: Bond failure is most often caused by:

- Inadequate adhesive application from incorrect trowel notch size, worn trowel notches and/or trowel notch configuration.
- Improper adhesive selection or quality.
- Incorrect open time.

8.4.2 Open time – Appropriate open time varies, depending upon environmental conditions, subfloor porosity, and adhesive type. Refer to adhesive and/or carpet manufacturer for recommendations for open time.

8.4.3 Alternative adhesive systems – Alternative systems, such as spray adhesive or roll adhesive films, are available for applying adhesive. Refer to carpet manufacturer’s recommendations as to the acceptability of these systems.

8.4.4 Carpet seams – Seams must be structurally sound and constructed in a manner that prevents loss of tufts, edge ravel, and delamination. All edges that are to be used for seams must be properly prepared.

8.4.5 Trimming – Seam edges must be trimmed with the tools and techniques best suited for the carpet being installed. Edges should be trimmed sufficiently far into the material to maintain the structural integrity of the carpet, producing matching edges capable of being joined without gaps or overlaps.

Note: Some woven carpet selvage edges must not be trimmed. Follow manufacturer's recommendations.

8.4.6 Sealing – For those carpet systems that require seam sealing, seam sealer must be applied to the edges trimmed for seaming, and cover the thickness of both the primary and secondary backing without contaminating the face yarn. The seam sealer is applied to the cut edge of only one side – that side being the first side put into the adhesive.

CAUTION: Seam edges **must** be sealed to prevent edge ravel, tuft loss, and delamination of the secondary backing in the seamed area.

8.4.7 Rolling – Rolling should be performed with the lightest roller that will achieve proper transfer of the floor adhesive into the carpet backing. Refer to manufacturer's recommendations for roller weight.

8.4.8 Finishing at wall line – The installation shall be finished along the wall line with a smooth, neat, and secure transition. It is recommended that carpet base, top-set cove base, baseboards, or other moldings be installed after the carpet is installed.

8.5 Double glue down – This method involves the bonding of a separate carpet cushion to a subfloor and the subsequent bonding of carpet to the cushion. Carpet, cushion, and adhesive must be recommended by their respective manufacturers as being suitable for that end-use application. Consult carpet, cushion, and adhesive manufacturers for specific installation recommendations.

CAUTION: When trimming carpet seam edges, care must be taken to not cut cushion. Doing so may result in seam failure of double-glue-down installation.

8.5.1 Traffic restriction – Upon completion of installation, traffic should not be allowed for a minimum of 24 hours.

9. Protection of Indoor Installation – Adequate protection of the finished installation must be provided.

9.1 Materials for protection – If required to protect the finished floorcovering from dirt or paint, or if additional work is to be done after the installation, cover with non-staining, building material paper. Plastic sheeting is not recommended because it may trap moisture, retarding adhesive curing and promoting mold and mildew growth. Protect the installation from rolling traffic by using sheets of hardboard or plywood over the affected areas.

9.2 Curing of adhesive – Traffic over adhesive installations should be restricted for a minimum of 24 hours to allow proper adhesive cure. Premature trafficking can cause installation failure. Exposure to water from cleaning and other sources should be restricted for a minimum of 30 days.

10. Radiant-Heated Floors

Radiant-heated floors require special consideration in the selection of carpet, carpet cushion, installation methods, adhesive, and method of installation.

CAUTION: Unless absolutely certain about the location of heating components, use adhesive to affix tackstrip and moldings.

Note: For adhesive installation, it is recommended that a high solids, premium adhesive be used and that the floor temperature not exceed 85°F.

Note: For additional information on carpet installation on heated floors, search the Carpet & Rug Institute's website www.carpet-rug.com

11. Carpet on Stairs

11.1 Properties - Carpet installed on stairs must be tight, smooth, and neatly finished without wrinkles, puckers, or indentations.

11.2 Preparation – Carpet should only be installed over steps with a rounded nosing with a radius of at least $\frac{3}{4}$ inch (19 mm). When carpet is installed over a separate cushion, the cushion must extend over the stair nose.

11.3 Carpet direction – Carpet length should be installed parallel to length of stairs.

12. Outdoor and Synthetic Turf

12.1 Site conditions – All outdoor installation surfaces must be clean, dry, sound, cured, smooth, and have adequate drainage.

12.2 Carpet selection – Carpet recommended for outdoor use should be selected.

12.3 Adhesives – Carpet backing and substrate must be compatible with adhesive selected. Adhesive installation over pressure-treated wood is not recommended.

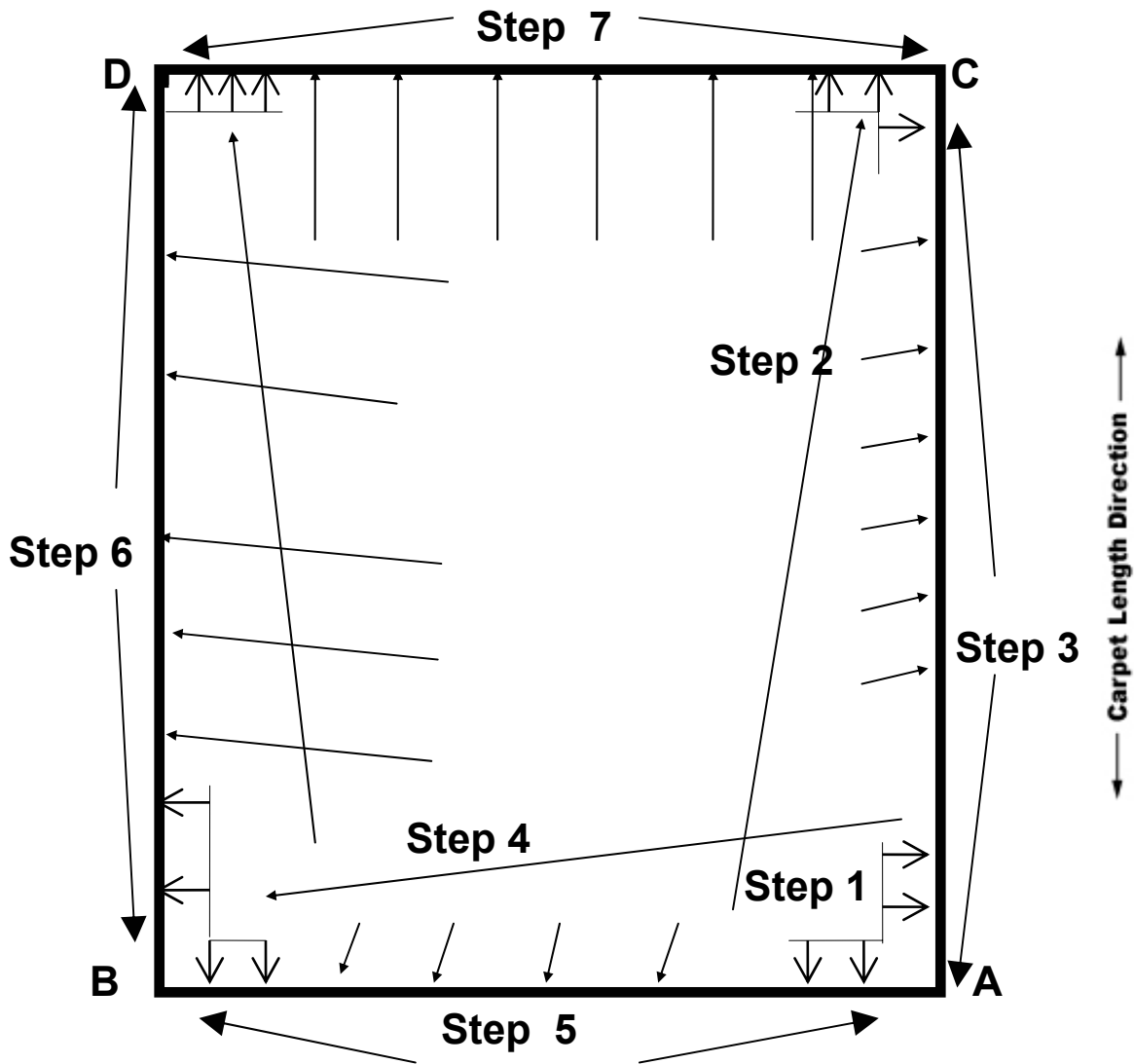
12.4 Edge sealing – Seam adhesive must be applied to all seam edges of tufted outdoor carpet, including all exposed edges.

TABLE I

TROWEL SIZE – MINIMUM GUIDELINES				
Direct Glue Down				
	Trowel Size (in inches*)			
Type Carpet Back	Notch Width	Notch Depth	Space Between	Notch Shape
• Polypropylene, woven mesh secondary	1/8	1/8	1/16	V
	1/8	1/8	1/8	U
• Unitary, no secondary fabric	1/8	1/8	1/16	V
	1/8	1/8	1/8	U
• Woven carpets	1/8	1/8	1/16	V
	1/8	1/8	1/8	U
• Hotmelt polymer	1/8	1/8	1/16	V
• Woven jute secondary	3/32	3/32	3/32	V
• Attached cushion	3/32	3/32	3/32	V
• Vinyl-backed broadloom	3/32	3/32	3/32	V
Double Glue-Down				
• Cushion to floor	1/16	1/16	1/16	□
• Carpet to cushion -smooth back carpet -rough back carpet	1/8	1/8	1/16	U
	1/8	3/16	1/8	U

Notes: The above guidelines should only be used when specific recommendations are not available from the carpet manufacturer and/or the adhesive supplier. Rough, porous concrete surfaces and heavily textured carpet backs often require trowels with deeper notches than listed above.

FIGURE 1 - Stretch Diagram for Tufted Carpet
 In the absence of carpet manufacturer's stretch recommendation, use diagram below.



- Step 1 – Hook onto tackstrip, approximately three feet in both directions, along corner A.
- Step 2 - Power stretch at approximately 15° angle from wall A-B and hook onto tackstrip at corner C.
- Step 3 - Hook and secure onto tackstrip with knee kicker along wall from A to C.
- Step 4 - Power stretch at approximately 15° angle from wall A-C and hook onto tackstrip at corner B.
- Step 5 - Hook and secure onto tackstrip with knee kicker along wall from A to B.
- Step 6 - Power stretch at approximately 15° angle from wall A-C and hook along wall from B to D.
- Step 7 - Power stretch straight from wall A-B and hook along wall from C to D.

DEFINITIONS OF TERMS

adhesive – A substance that dries to a film capable of holding materials together by surface attachment. [Application of adhesive to the floor is normally made with a trowel, airless spray, or roller.]

adhesive transfer – In carpet installation, the degree of coverage and/or penetration of the applied adhesive into the back of carpet while maintaining a full coverage of the floor. [The degree of coverage may be influenced by adhesive type, method of installation, open assembly time, and other factors.]

alkali – A soluble substance with basic properties and having a pH of more than 7.

attached cushion – Cushion material permanently bonded to the back of carpet and rugs by the manufacturer.

Axminster carpet – Carpet woven on an Axminster loom. Pile tufts are individually inserted from variedly-colored yarns arranged on wide spools, making possible the production of carpet and rugs in complex designs with many colors, such as Oriental design.

baseboard – A board skirting the lower edge of a wall, covering the joint of the wall and the adjoining floor.

birdcage – Common term used to describe the end of a stair rail where the banisters are curved in a spiral to form a newel post.

bullnose – Common term used for step return.

carpet cushion – Material placed under carpet to provide resiliency, support, and noise absorption. Also referred to as carpet lining, padding, or underlay, although “carpet cushion” is the preferred industry term.

conditioning – The process of allowing the carpet to relax or acclimate to the environment into which it is to be installed.

custom carpet – A carpet or rug manufactured in a special size, shape, color, design, or width by a tufted or woven manufacturing process.

dead man – A device used in carpet installation to provide a point of resistance for facilitating stretching procedures. Construction is a board with strips of tackstrip attached to the bottom side.

direct glue down – An installation method whereby the carpet is adhered to the floor.

double glue down – An installation method whereby the carpet cushion is first adhered to the floor, and the carpet is then adhered to the cushion.

gully – The distance between the tackstrip and the wall. A gully should always be slightly less than the thickness of the carpet and not exceeding 3/8 inch.

knee-kicker – An installation tool designed to position carpet and move it onto the tackstrip. [NOTE: With the exception of stair installation, knee-kickers should only be used for positioning and hooking the carpet onto the tackstrip and not for stretching carpet. A power stretcher should always be used for stretching carpet during installation. See definition of power stretcher.]

knitted carpet – Carpet produced in a fabric formation of interlacing yarns in a series of connected loops by the use of needles. Pile and backing are produced simultaneously. Multiple sets of needles interlace pile, backing, and stitching yarns in one operation.

modular carpet – Carpet squares, often 18 inches by 18 inches (457 x 457 mm) each but also available in other sizes, with or without attached cushion backing. Also referred to as “carpet tiles.”

molding – A wooden, metal, vinyl, or plastic strip, either quarter round or shoe molding, attached to the bottom of a baseboard or wall to cover the joint between wall and floor or to cover raw edges of carpet at doorways or where carpet abuts another type of floor covering. There are two basic types: 1) Applied before – Shapes put in place before carpet is installed and carpet is fitted to them, commonly called “gripper bar”; 2) Applied after – Shapes put in place on top of installed carpet commonly called “binder bar.”

open time – The time interval between the spreading of adhesive on a substrate and the appropriate placement of a floor covering material into the adhesive for bonding.

patching – Process of repairing holes, cracks, breaches, etc., in a floor surface prior to installation of carpet.

pattern bow – A distortion visible as wavy or crooked pattern lines when viewed across carpet width.

pattern elongation – A variation of cumulative pattern measurements from one breadth to the next. Often referred to as “pattern run-off” or “repeat variation.” [Sequencing of cuts minimizes effects.]

pattern skew – A distortion visible when the pattern on one side is slightly ahead of the pattern on the other side. Skew, or bias, describes pattern squareness.

pH – A value representing the concentration of hydrogen ions in gram equivalents per liter used to indicate the acidity or alkalinity of a substance on a scale from 0 to 14 with 7 representing neutrality, numbers less than 7 increasing acidity, and numbers greater than 7 increasing alkalinity. [Laboratory and field testing for pH must be done with distilled water.]

power stretcher – A carpet installation tool used to stretch carpet for installation on the tackstrip. Consists of a pinned plate that grips the carpet, tubular extensions, a padded end used to brace against an opposing wall or other structure, and a lever system that multiplies the installer’s applied stretching force.

quarter-round – Wooden or plastic molding with a cross section that is a 90° arc of a circle. Used as joints between walls and floors or between larger moldings and floors.

relax – See “conditioning.”

restretch – Stretching installed carpet after original installation to remove wrinkles and bubbles or to correct loose fit.

riser – The upright part of a step between two stair treads.

seam – In a carpet installation, the joints or interface of two pieces of carpet by the use of various securing techniques.

seam adhesive – A specifically formulated adhesive for securing cut edges of carpet to be seamed.

seam peaking – The slight elevation of taped seams, which usually renders the seam more visible, resulting from stretching of the carpet. [Sometimes referred to as “seam stress realignment” peaking is a natural and sometimes unavoidable condition and not the result of a manufacturing or installation defect. For additional information, refer to CRI Technical Bulletin “Peaking Seams in Stretch-In Carpet Installations.”]

seam sealing – Common term used to describe the application of seam adhesive to secure cut edges of carpet to be seamed.

seaming tape – Fabric tape used for joining two sections of carpet. [“Hot melt” tape is pre-coated with a thermoplastic adhesive. Adhesives may be applied separately to other types of seaming tapes.]

secondary backing – Woven or nonwoven fabric reinforcement laminated to the back of tufted carpet, usually with an adhesive, to enhance dimensional stability, strength, stretch resistance, and ease of handling.

selvage (selvedge) – The lengthwise, factory-finished edge portion of a carpet.

shoe molding – Wood or plastic strip with one corner edge rounded slightly. Used to conceal joints between walls and floors or between larger moldings and floors.

stair nosing – Material used to cover the nose of a stair when stairway is not upholstered. Commonly used to demarcate the edge of a stair in restaurants, theaters, etc.

stay nailing – A temporary fastening of carpet to the floor to prevent movement until permanent fastening with tackstrips, adhesives, or other means is possible.

stretch-in – Installation method whereby carpet is placed over separate carpet cushion and is secured in place, under tension, using a power stretcher.

tackstrip – Wood or metal strip fastened to the floor near the walls of a room, containing either two or three rows of pins angled toward the walls on which the carpet is stretched and secured in a stretch-in installation. (Also referred to as “tackless strip”)

telegraphing – The gradual appearance of irregularities, imperfections, or patterns from a substrate onto the surface of the carpet or other floor covering.

textile floor covering – General description used for carpet, rugs, etc.

threshold – The raised material beneath a door. Also known as a “door sill” or “saddle.”

tread – The upper horizontal part of a stair.

trowel – Hand implement used for metering and spreading adhesive to the floor or other substrate.

trueness of edge – lengthwise pattern bow. It is generally measured as maximum deviation from a straight line, over a fairly long distance, between common pattern points along the edge of the carpet at or very close to where the edge will be trimmed for seaming.

tufted carpet – Carpet manufactured by the tufting process. Pile yarns are inserted into a primary backing fabric by rows of eyed needles.

unitary carpet – Carpet backcoated with high performance, often impermeable compound that yields increased tuft bind properties with or without the addition of secondary backing. Used for direct glue-down installation.

VOC – Abbreviation for Volatile Organic Compound.

velvet carpet – 1) Carpet woven on a velvet loom; typically cut pile or level loop in solid or tweed colorings, though textured and patterned effects are possible; 2) Common term for cut pile “plush” carpet.

vinyl plasticizer – A substance incorporated into polyvinyl chloride polymer to increase flexibility, workability, or distensibility (capable of being extended).

wall base– Trim material attached at the base of a vertical surface.

Wilton carpet – Carpet woven on a loom equipped with a Jacquard mechanism, which utilizes a series of punched cards to select pile height and yarn color. May be cut pile or loop pile or combination.

woven carpet – Carpet produced on a loom. The lengthwise (warp) yarns and widthwise (weft or filling) yarns are interlaced to form the fabric. Carpet weaves, such as Wilton, Axminster and velvet, are complex, often involving several sets of warp and filling yarns for the pile and backing.