

Out of all the commonly used finished floor materials, carpet provides the warmest sensation on the floor. Even though that is the case, many carpet installations can benefit from the use of a radiant floor warming system, especially if the floor is over an unheated space.

The following information provides a basic overview of the design and installation needs and concepts for STEP Warmfloor™ systems installed in carpeted floors.

### Element Spacing

While carpet has one of the highest insulating values out of the commonly used finished floor materials, the STEP Warmfloor™ heating elements can be placed upwards of 6 to 8 inches apart and may still provide even heat across the floor. Care must be taken in the proper sizing of the system, the proper selection of thermal insulation, and most importantly, the proper selection of the carpet cushion to ensure that the system will provide even heat distribution.

An element spacing larger than 6 to 8 inches will have a cold stripe down the center of that spacing, resulting in undesirable performance for the customer. A spacing tighter than 6 inches, even down to 1 inch, is used to provide a very even floor surface temperature and to increase the floor response time to temperature changes in the room.

### Thermal Insulation

The thermal insulation type and thickness selection is very important to ensure proper performance because of the low rate at which carpet transfers heat upwards and laterally. Without the

use of insulation or with improperly installed insulation, cold stripes may be evident even with a tight element spacing. As a minimum, you need to have more R-value below the elements than above.

Refer to the STEP Warmfloor™ Design Note on thermal insulation for additional information.

### Carpet Cushion Selection

For a STEP Warmfloor™ system installed under carpet, the selection of the carpet cushion is critical to ensure even heat distribution and the customer's satisfaction with the system performance. Carpet cushion types fall into three basic categories: polyurethane (foam), rubber or fiber. In each category, various degrees of quality, performance and suitability can be found. To be suitable for use with a STEP Warmfloor system, a carpet cushion must have some very specific characteristics.

The cushion must be a moisture barrier to prevent the descent of liquids down through the carpet, the cushion and to the elements. The acids and other aggressive agents that can be found in some fruit drinks, sodas, pet accidents and other various liquids must be prevented from reaching the heating elements. This is to prevent the creation of undesirable odors caused by the warming of these liquids by the heating elements or the possible degradation of the elements from long-term exposure to aggressive liquids.

In addition, the carpet cushion must have a sufficient density rating, thickness and cellular structure to assist with transferring

heat laterally within the finished floor. The cushion should be a commercial rated product to assist with achieving the desired physical characteristics.

Polyurethane carpet cushions are generally available in these three varieties: bonded, prime or frothed. Bonded polyurethane, otherwise known as "rebond", is the most common cushion on the market but should never be used with any radiant heat system. Its long-term characteristics will result in the creation of a dense insulation layer that will not allow the radiant heat to properly pass. Both prime and frothed can be used with the STEP Warmfloor system. The widest possible heating element spacing is obtained with suitable frothed products.

Sponge rubber carpet cushions are generally available in these two varieties: waffled and flat. As its name implies, waffled rubber cushions have a waffled structure that allows a thinner layer of rubber to provide a higher level of cushioning. Flat rubber cushions rely on a thicker layer of a flat sheet of rubber to provide an equivalent level of cushioning. Because of the low R-value of rubber, a tighter element spacing (3" maximum) is recommended for a floor warming application to provide an even floor temperature.

Most, if not all, fiber cushion products are eliminated from use with STEP Warmfloor™ systems because of both the moisture barrier and density requirements.

## Floor Layering Options

Carpet is either installed using a stretch-in or glue down installation method.

### Stretch-in Method

This method entails installing the STEP Warmfloor™ heating elements directly onto the subfloor. Attach the element to the subfloor and install the extension wires per the manufacturers instructions. Install the carpet tack strips around the perimeter of the room. Coordinating the location of the extension wires and the tack strips is important as they both will share the same space around the perimeter of the room. Install the carpet cushion directly over the heating elements and then install and stretch-in the carpet directly over the cushion.

The placement of heavy furniture on the finished carpet over the heating elements is expected and will not cause a problem. Care must be taken when moving heavy objects across the floor so as not to cause damage to the carpet, the cushion and all the way down to the heating elements.

### Glue Down Method

The STEP Warmfloor™ system should not be in direct contact with any aggressive solvents or construction adhesives. With glue down installations, a protective layer must be installed over the heating elements to prevent direct contact with the carpet glue. Install the elements and the extension wires the same as for the stretch-in method. Determine the best protective layer option and install that over the elements. Glue down the carpet cushion and carpet following the manufacturers instructions.

Examples of protective layer options include self-leveling compounds and a plywood covering.

Self-leveling compounds are used primarily to level an uneven subfloor before the installation of the finished floor. In this situation, the self-leveling compound would be used to completely cover and encapsulate the heating elements and provide a new flat surface for the installation of the glue down

carpet. Ensure that you follow the manufacturer's directions for the self-leveling compound, especially curing times required before energizing the heating elements.

When using a complete coverage of plywood over the heating elements, the thickness of the plywood needs to be sufficient to properly and evenly support the finished floor.

### Resources

Various resources are available to guide you, your architect, and your builder in selecting the correct carpet solutions for your application. For additional information, refer to the Carpet and Rug Institute website ([www.carpet-rug.com](http://www.carpet-rug.com)) or the Carpet Cushion Council website ([www.carpetcushion.org](http://www.carpetcushion.org)). The STEP Warmfloor™ Handbook has some basic guidelines and suggestions on using a STEP Warmfloor™ system with carpet. In addition, your STEP Warmfloor™ distributor /retailer may be able to offer assistance.

### **WARNING:**

As new products continuously enter the market, it is very important to identify the composition, chemical behavior and compatibility of all ingredients and building materials used in an installation. STEP Warmfloor™ must not be in direct contact with any conductive material or installed with aggressive solvents, acids or adhesives.



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