

The advantages of energy efficiency combined with a distinctly comfortable heat source have made heated floors increasingly popular in many parts of the country. Often referred to as hydronic or “radiant heated” floors, these floor systems have been popular in Europe for many years.

Most systems utilize low temperature water of about 80°F to 125°F flowing through flexible tubing installed beneath the floors. These systems can be embedded in concrete slabs, lightweight overpours or in joist cavities.

Floor Covering Considerations

With installations involving carpet and cushion, consideration must be given to the thermal resistance rating (R-value) of the carpet and cushion products. Manufacturers of heated floor systems state that less thermally conductive floors, such as those covered with thick carpets, particularly with heavy cushions beneath, may require the use of hotter water. Regardless, most homeowners accept some efficiency reduction so that the additional benefits offered by carpet will be enjoyed. A not-so-obvious benefit not to be overlooked is that carpet tends to shorten the heating season by providing a “warm” floor rather than a “cold” floor as with other types of floor coverings.

The efficiency of heated floor systems can be improved by properly selecting the carpet cushion. Most radiant heated floor manufacturers suggest a total maximum R-value for carpet and cushion installations not to exceed 4.0. With heated floors, lower pile carpet and lower thickness cushion are better than higher pile carpet and thicker cushions. When cushion is used, it should be no thicker than 3/8”.

Carpet Thermal Study

An industry sponsored study on the thermal characteristics of carpet with and without cushion conducted by the Georgia Institute of Technology School of Textile Engineering concluded that the total R-value is more dependent on the total thickness of the carpet than the type fiber content.

When the carpet R-value is not available, the study suggested to multiply the total carpet thickness measured in inches by a factor of 2.6 to approximate the carpet’s R-value. The study also found R-values to be additive for any combination of materials. For example, a combination of carpet with an R-value of 1.3 and a prime polyurethane cushion with an R-value of 1.6 will yield an overall R-value of 2.9.

Installation Considerations

When the direct glue down method of carpet installation is used, the heat should be turned down to keep the adhesive from drying too quickly before receiving the carpet.

When installing the tackless strip for stretch-in installations, the fastening nails should not be driven into the tubing or cables embedded in the floor.

Most conventional carpet is suitable for use over heated floors; however, it is advisable to confirm with the carpet manufacturer that the backing is resistant to long periods of low continuous heat.

Note: The following R-value information was taken from the study conducted by the Georgia Institute of Technology School of Textile Engineering.

CARPET – TYPICAL R – VALUES

Sample No.	Fiber Type	Yarn Type	Style	Pile Height (inches)	Pile Weight (oz/sq. yd.)	Gauge	Stitches per inch	Tufts/In ² SPI x GA	R-Value
1.	Nylon	CF	LL	.125	10	1/10	8.0	80	0.68
2.	Nylon	CF	LL	.109	20	1/8	6.0	48	0.65
3.	Nylon	CF	LL	.192	28	1/8	8.4	67.2	0.67
4.	Nylon	CF	LL	.125	24	1/10	8.6	86	0.55
5.	Nylon	S	Plush	.250	24	1/8	11.0	88	1.12
6.	Nylon	CF	HLL	--	24	5/32	8.6	55	1.33
7.	Nylon	CF	Shag	1.07	24	3/16	5.2	27.7	1.51
8.	Acrylic	S	LL	.210	42	1/10	8.0	80	0.78
9.	Acrylic	S	LL(FB)	.210	42	1/10	8.0	80	1.03
10.	Polyester	S	Plush	.280	42	5/32	8.5	54.4	0.95
11.	Polyester	S	HLL	--	42	5/32	8.5	54.4	1.66
12.	Nylon	S	Saxony	.552	40	3/16	5.5	29.3	1.96
13.	Nylon	CF	Shag	1.25	43	3/16	4.2	22.4	2.46
14.	Wool	S	Plush	.487	43	5/32	7.0	44.8	2.19
15.	Nylon	S	Plush	.812	58	1/8	10.0	80	1.83
16.	Acrylic	S	Plush	.688	53	5/32	9.0	57.6	1.90
17.	Acrylic	S	Plush	.530	44	3/16	8.25	44	1.71
18.	Olefin	CF	LL	--	20	--	--	--	0.70

Legend: LL = Level Loop HLL = High-Low Loop (tip sheared) FB = Attached foam back S = Spun Yarn
CF = Continuous Filament Yarn

CARPET CUSHION – TYPICAL R – VALUES

Material	Thickness (in.)	Weight oz/sq yd	Density lbs/cubic ft.	R -Value
Prime Polyurethane	.40	10.3	2.2	1.61
Slab Rubber	.23	62.0	---	0.62
Waffled Sponge Rubber	.43	49.2	---	0.78
Hair & Jute Coated	.44	52.6	---	1.71
Bonded Polyurethane	.50	---	4.0	2.09