

# Thermal Insulation Performance of Carpet

Carpet is an exceptionally good insulating material.

Carpet fibres are natural insulators with low heat conduction values. In addition, the surface pile of carpet with its millions of tiny fibres traps air and further increases its thermal insulation.

As can be seen from the table, the thermal resistance of carpet is significantly higher than that of concrete and plywood, two common flooring materials, and similar to fiberglass insulation. In fact the insulation value of carpet can be up to 10 times higher than that of hard floor covering.

## Thermal Resistance of Materials<sup>1</sup>

Material	Thermal Insulation* R value (m <sup>2</sup> K/W)
Concrete (10 cm thick)	0.07
Plywood (1 cm thick)	0.08
Carpet (1 cm thick)	0.18
Fibreglass insulation (1 cm thick)	0.22

\*The R-value is used to measure a material's resistance to heat transfer or thermal resistance – the higher the R-value the greater the insulating effect.

The thickness of the carpet is the major factor determining the thermal insulation. The thicker the carpet the greater the thermal insulation provided. So when carpet is installed over underlay or carpet cushion further increases in thermal insulation are obtained.

Carpet can help to reduce energy costs in heating and cooling when there is a temperature differential between the indoor air and that under the floor. Uninsulated floors account for 10 to 20% of heat loss from a home.

The greatest benefit from a carpet is obtained when as large an area as possible, preferably wall to wall, is covered. This is because the reduction in heat loss is proportional to the area carpeted.<sup>2</sup>

## Footnotes

1. Carpet Buyers Handbook (R values converted to metric units used in Australia = m<sup>2</sup>K/W )
2. Thermal Insulation Properties of Wool Carpets - Wools of New Zealand (2002)

*“The thicker the carpet the greater the thermal insulation provided.”*

**For peace of mind buy ACCS graded carpet**



Research conducted by Wools of New Zealand found that the energy savings, both heating and cooling, were in the range of 8 - 12% as can be see from the following tables.<sup>2</sup>

Electrical Power Saving (**Room Heating**) due to carpet installation in a one-room model house

Carpet	Pile height mm	Carpet Thickness mm	Total weight kg/m <sup>2</sup> *	Energy Saving Heating %
Cut pile	5.0	7.3	1.722	8.6
Cut pile	7.0	9.2	1.963	11.3
Cut pile	10.0	11.7	2.257	12.8

A carpeted floor feels warmer under foot and does not require the heating that a smooth surface may. This will add further energy savings to those shown above.

Electrical Power Saving (**Room Cooling**) due to carpet installation in a one-room model house

Carpet	Pile height mm	Carpet Thickness mm	Total weight kg/m <sup>2</sup> *	Energy Saving Cooling %
Cut pile	5.0	7.3	1.722	8.0
Cut pile	7.0	9.2	1.963	10.4
Cut pile	10.0	11.7	2.257	11.7

A carpeted room promotes thermal comfort, saves energy and also contributes to a reduction in green house gas emissions that are a major cause of climate change. For this reason the Federal Government's Your Home Technical Manual (section 4.7) recommends insulating timber or elevated slab floors to reduce heat loss<sup>3</sup>. The NSW Government's sustainability rating certificate for housing, Basix<sup>4</sup>, rewards suspended floor insulation that can be effectively accomplished with carpet.

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## About the Carpet Institute of Australia

The Carpet Institute of Australia Limited (CIAL) is the lead industry association for Australia's \$1.6 billion carpet industry. CIAL represents carpet manufacturers accounting for 95% of Australian carpet production, as well as retailers and suppliers of goods and services to the industry.

### Footnote

3. Your Home Technical Manual section 4.7 Insulation (see [www.yourhome.gov.au/technical/fs47.html](http://www.yourhome.gov.au/technical/fs47.html))
4. Basix tips on meeting certification standards at [www.basix.nsw.gov.au/information/common/pdf/basix\\_indices.pdf](http://www.basix.nsw.gov.au/information/common/pdf/basix_indices.pdf)

**Carpet Institute of Australia Limited** ABN 11 006 829 303

PO Box 7172, St Kilda Road, Melbourne 8004 Tel: (03) 9804 5559 • Fax: (03) 9804 5560

Email: [info@carpetoz.com.au](mailto:info@carpetoz.com.au) • Web: [www.carpetinstitute.com.au](http://www.carpetinstitute.com.au)

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