

# The role of polyurethanes in building insulation

This information sheet explains how polyurethanes are made, and their role in insulating Australia's built environment.

## What are polyurethanes?

Polyurethanes are polymers – chains of structures made from repeating units bonded together called monomers.<sup>1</sup>

While there are thousands of natural and man-made polymers,<sup>1</sup> polyurethanes are a type of polymer formed by reacting a polyol with diisocyanate or polymeric isocyanate.<sup>2</sup>

Due to the range of possible combinations, polyurethanes are some of the most versatile plastics – able to take on multiple forms including foams, coatings, sealants, adhesives and elastomers.<sup>1</sup>

They surround us in our daily lives – from the mattresses we sleep on, to the shoes we wear, to the insulation in our homes and the paint that coats our built environment.<sup>1</sup>

## Why insulation is key in the building industry

In Australia, heating, cooling and running buildings makes up around 19 per cent of total energy consumption – producing greenhouse gases (carbon dioxide) in the process.<sup>3</sup>

Insulation plays a key role in moderating this consumption and making buildings more energy efficient – helping to regulate indoor temperatures and reduce energy use, greenhouse gas emissions and costs for consumers.<sup>4</sup>

## Polyurethane Insulation

Polyurethanes used for building insulation are lightweight, have a rigid foam matrix<sup>5</sup> with a closed cell structure and high cross-linking density.<sup>6</sup> As a result, rigid polyurethane insulation (PUR) and polyisocyanurate insulation (PIR) have superior insulating properties compared to other types of insulation.<sup>5,6</sup>

PUR and PIR insulation materials are thermosets, which means they do not melt when exposed to heat. They are strong, largely resistant to water and moisture, durable, and remain stable at a range of temperatures.<sup>7</sup>

They have some of the best thermal conductivity measurements of commonly available insulants and take up less space than alternative insulation. This saves space and land use without sacrificing performance.<sup>8</sup>

Their versatility means they can take many forms in our buildings – from insulated panel systems to spray-on insulation, pipe insulation, pre-insulated ductwork and cold stores.<sup>4</sup>

PUR and PIR insulation products are easy to install on existing and new buildings, and provide a high level of performance throughout a building's life cycle. As a result, far more energy is saved over the life of the product than is used in its manufacture.<sup>4,6</sup>

## References

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