

PASCAL™ Technology

A Breakthrough in Energy Efficiency for Appliance Manufacturers





GET UP TO
50% GREATER PRODUCTIVITY
WITHOUT INCREASING COSTS OR
SACRIFICING QUALITY AND DESIGN.



ENERGY EFFICIENCY WITHOUT COMPROMISE

As a manufacturer in the household appliances business, you know it's important to improve energy efficiency to meet new regulations as well as consumer expectations. You also know that adding energy efficiency improvements often limits design and reduces interior space in appliances. Now there's a better solution.

PASCAL™ Technology from The Dow Chemical Company is a new polyurethane system that significantly increases household appliance energy efficiency performance, without negatively affecting design or productivity. The Dow-patented technology brings a step change in energy performance, while offering a consistent and quality manufacturing process to insulate refrigerators and freezers. PASCAL Technology has been fully tested by Dow and validated on commercial refrigerators from leading international appliance manufacturers as providing the leading edge in appliance-manufacturing technology.

How the System Works

PASCAL™ Technology is a two-component system that uses a vacuum process along with specially formulated polyurethane foam from Dow to fill the insulating cavity of the appliance cabinet. The combination of polyurethane formulation and vacuum system can fill the cabinet's cavity in less time than standard processes, enabling an effective and consistent cavity filling without using more material. Because of the specially designed and patented vacuum equipment developed by Cannon SpA, the foam material is actually pulled into the cavity instead of relying on the foam to fill by itself. And the specially designed foam reacts quickly, so you may need less material while filling the cavity faster, fully and more consistently.

How the System Can Help You and Your Business

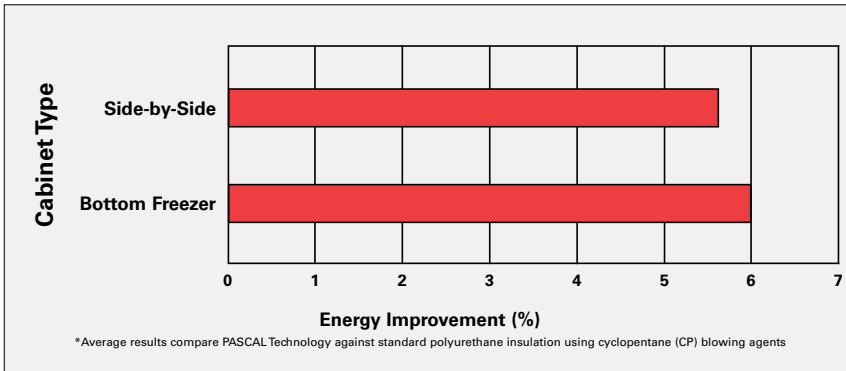
PASCAL™ Technology brings three key advantages for appliance manufacturers:

- **Advanced energy efficiency** – Allows you to meet increasing government regulations without raising costs by achieving up to 10 percent greater energy efficiency over current polyurethane insulating systems.
- **Innovative appliance solution** – Helps you maintain performance with potential for margin expansion while meeting or exceeding government regulations.
- **Improved productivity** – Enables you to improve product line productivity by decreasing fill time by about 20-30 seconds over traditional fill processes, as well as enabling significantly faster demold time.

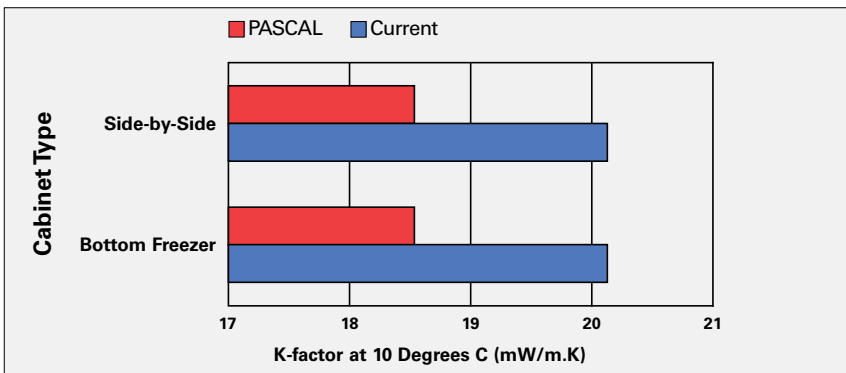
PASCAL™ Technology typically costs no more to implement than traditional polyurethane insulation technologies, yet this leading-edge appliance manufacturing technology can lead to vast improvements in energy efficiency and productivity.

COMPARE THE DIFFERENCE

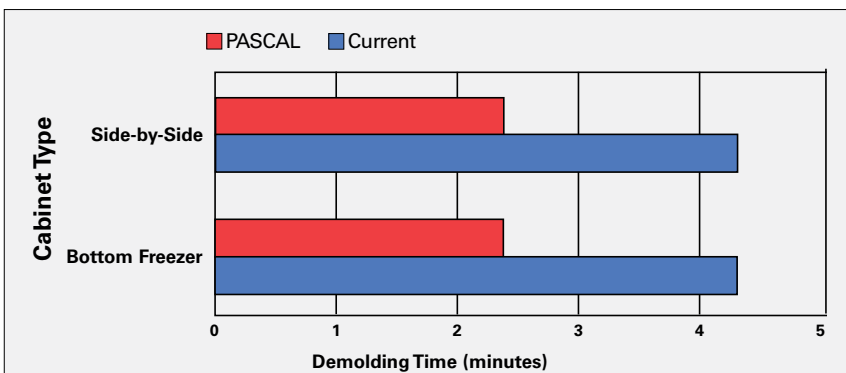
PASCAL™ Improves Energy Efficiency*



PASCAL™ Enables Lower K-Values



PASCAL™ Reduces Demold Time



Sustainability in Action

PASCAL™ Technology is another example of many innovative products and technologies from Dow that improve energy efficiency. Since the invention of STYROFOAM™ Brand Insulation in 1944, Dow has been a world leader in insulation technology and energy efficiency in a wide variety of industries and applications. Dow connects chemistry and innovation with the principles of sustainability, which include developing solutions for energy efficiency and climate change. Dow's commitment to sustainability includes an ambitious set of goals focused on solving some of the world's most pressing problems and also reducing our own global footprint. For more information on Dow's sustainability and energy commitments, visit dow.com/sustainability or energy.dow.com.

Dow and Cannon – Collaborating for Energy Efficient Technology

The success of PASCAL™ Technology owes much to the strong and strategic cooperation between Dow and Cannon SpA that gave rise to the innovative system. As a longtime equipment supplier for Dow's own polyurethane manufacturing operations, Cannon's reputation for outstanding quality, efficiency, innovation and service was well known. When the developers of the PASCAL formulation sought an equipment partner, they saw an opportunity to leverage Cannon's global reach and extensive capabilities in designing and manufacturing customized technical solutions.



"We appreciate the opportunity to work with a company that has the same core values," said Marco Volpato, Managing Director, The Cannon Group. "Our vision for environmental sustainability and our customer commitment are very much aligned with Dow's. Now, more than ever, energy efficiency is driving markets, products and technologies, and we are honored to be an integral part of helping bring this breakthrough technology to the market."

How Can We Help Improve Your Operation?

To learn more about PASCAL™ Technology and how it can benefit your business, contact a Dow representative in your region. Or visit our website at www.dowpascal.com.

For questions regarding PASCAL™ Technology equipment, contact our machine partner, Cannon SpA, at www.vai.cannon.com.

Making a Difference ... to the Planet and Your Bottom Line

PASCAL Technology can boost the energy efficiency of appliances up to 10 percent without impacting design or production costs.

PASCAL Technology can decrease fill time by about 20-30 seconds over traditional processes and enable significantly faster demold time.

When PASCAL is used in place of standard appliance PU insulation, it may save 8 kg of CO₂ equivalent emissions per year.¹

If PASCAL Technology reaches 100 percent market penetration, it has the potential to save about 1.2 million tons of CO₂ emissions each year – that is the equivalent of taking more than 200,000 cars off the road.²

¹Relative to an average PU weight of 10 kg/appliance

²Source: www.epa.gov/cleanenergy/energy-resources/calculator.html#results



PASCAL™ Technology

About Us

Dow Polyurethanes

Dow is the world's largest producer of propylene oxide (PO), propylene glycol (PG), and polyether polyols, and is a leading producer of quality aromatic isocyanates, such as MDI and TDI. Dow's polyurethane products enhance a broad range of applications including construction, automotive, furniture, bedding, appliance, decorative molding, athletic equipment and more. The business provides key ingredients, systems and solutions for rigid, semi-rigid and flexible foams, adhesives, sealants, coatings, elastomers and binders. VORANOL™ VORACTIV™ polyols exemplify Dow's ongoing initiative to lead the industry in providing high-performance products that meet critical consumer needs. For more information, visit www.dowpolyurethanes.com, www.dowpg.com, www.dowpo.com and www.voractiv.com

The Dow Chemical Company

Dow combines the power of science and technology with the "Human Element" to passionately innovate what is essential to human progress. The Company connects chemistry and innovation with the principles of sustainability to help address many of the world's most challenging problems such as the need for clean water, renewable energy generation and conservation, and increasing agricultural productivity. Dow's diversified industry-leading portfolio of specialty chemical, advanced materials, agrosiences and plastics businesses delivers a broad range of technology-based products and solutions to customers in approximately 160 countries and in high growth sectors such as electronics, water, energy, coatings and agriculture. In 2010, Dow had annual sales of \$53.7 billion and employed approximately 50,000 people worldwide. The Company's more than 5,000 products are manufactured at 188 sites in 35 countries across the globe. References to "Dow" or the "Company" mean The Dow Chemical Company and its consolidated subsidiaries unless otherwise expressly noted. More information about Dow can be found at www.dow.com.

Dow Polyurethanes

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*International toll free from Austria, Belgium, Denmark, Finland (prefix 990), France, Germany, Hungary, Ireland, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Dow testing data is available upon request.

Safety Considerations

Most VORACOR™ Polyols generally present no significant hazard in use when simple precautions are followed. However, some VORACOR Polyols are hazardous. Before working with VORACOR Polyols, it is necessary to understand the hazards involved in handling all of the components and to establish and follow safe work procedures. Products based on diisocyanates like MDI and TDI (e.g., VORAMER™ MDI and VORANATE™ Polymeric MDI) should always be used in a well ventilated area with appropriate local extraction in such a way that the occupational exposure limits (OEL) for these materials are not exceeded.

Products based on diisocyanates like MDI and TDI are potentially hazardous and require care in handling. All persons who work with these materials must know and follow proper safe handling procedures. Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) are provided to help customers satisfy their own handling, safety, and disposal needs and those that may be required by locally applicable health and safety regulations. MSDS are updated regularly; therefore, please request and review the most current MSDS before handling or using any product. MSDS, SDS, product literature, and safe handling and storage information for all of these products are available from the nearest Dow sales office and online at www.dow.com.

Customer Notice

Dow encourages its customers to review their applications of Dow products from the standpoint of human health and environmental quality. For further information about safety considerations for your product/ application, please contact your Dow sales representative.

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