

# Honeywell Enovate® HFC-245fa Blowing Agent



## insulated panels

- superior insulation performance and foam quality
- better foam adhesion
- improved processing and durability

**Honeywell**

## HCFC-22 phase-out: March 1, 2008

On March 19, 2007, the U.S. Environmental Protection Agency (EPA) finalized a rule determining that HCFC-22 is an unacceptable substitute for CFC and HCFC blowing agents in commercial refrigeration, sandwich panels, slabstock, and other rigid polyurethane foams.

EPA issued this rule as a result of progress in the foam industry on adopting non-ozone depleting technologies. In order to allow for sufficient time to convert, existing users of HCFC-22 in pour foam applications other than marine flotation foam will be allowed to continue use until March 1, 2008.

This rule addresses effects of stratospheric ozone depletion and health and environmental risks of ozone-depleting substances. The ultimate impact will be to reduce skin cancer, cataracts, and other adverse impacts of ozone depletion.  
<http://www.epa.gov/ozone/snap/foams/FinalNPRMfactsheet.html>

## Honeywell Enovate® blowing agent: the ideal replacement

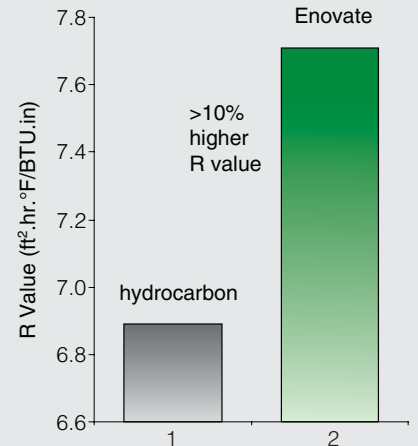
Honeywell Enovate® blowing agent, a non-flammable, non ozone-depleting product, is Honeywell's latest innovation for high R-value, closed-cell foam.

**Superior performance** – Panels formulated with Enovate show higher R-value by more than 10% compared to hydrocarbon-blown panels. In other testing performed by Honeywell and independent groups, Enovate outperformed HCFC-22 and HFC-134a by similar margins.

**Better foam adhesion** – Panels manufactured with Enovate do not exhibit the voids seen with low boiling point blowing agents, which contribute to “post installed blistering”. Panels manufactured with Enovate demonstrate improved adhesion to the metal panel surface. Unlike hydrocarbons, Enovate does not condense as the temperature drops in typical cold storage applications which leads to further reduced R-value and potential dimensional stability issues.

**An environmental solution** – Enovate is classified as a non-VOC at the Federal Level and is a US EPA SNAP (significant new alternatives program) approved replacement for HCFC-22. In 2002 Honeywell received the US EPA's Stratospheric Ozone Protection Award for the development and commercialization of Enovate.

### Enovate® vs hydrocarbon @ 30°F mean temperature\* aged 30 days



\*ASTM C518-04 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus. References available upon request.

HCFC-22	Hydrocarbon	HFC-134a	Honeywell Enovate (HFC-245fa)
<ul style="list-style-type: none"> <li>• Very low boiling point               <ul style="list-style-type: none"> <li>- Gas at room temperature</li> <li>- Can escape during foaming resulting in excessive voids and losses to the environment</li> </ul> </li> <li>• Higher in-place density</li> <li>• Foam thermal conductivity comparable to hydrocarbon and HFC-134a</li> </ul>	<ul style="list-style-type: none"> <li>• Relatively high boiling point               <ul style="list-style-type: none"> <li>- Cell-gas condensation at low temperature degrades foam thermal performance</li> <li>- Blistering issues</li> </ul> </li> <li>• Flammable liquid               <ul style="list-style-type: none"> <li>- Explosion-proof handling required</li> <li>- May need upgraded fire suppression, higher insurance rates</li> <li>- Formulations require higher flame retardant loading</li> <li>- May be more difficult to get fire ratings on finished products</li> </ul> </li> <li>• Volatile organic compound               <ul style="list-style-type: none"> <li>- VOC permit and incineration equipment needed in non-attainment areas.</li> </ul> </li> <li>• High solubility in foam matrix               <ul style="list-style-type: none"> <li>- Poorer dimensional stability upon aging</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Very low boiling point               <ul style="list-style-type: none"> <li>- Gas at room temperature</li> <li>- Escapes during foaming resulting in excessive voids and losses to the environment</li> <li>- Reduced foam flowability in panels</li> </ul> </li> <li>• Higher in-place density</li> <li>• Reduced adhesion</li> <li>• Foam thermal conductivity similar to hydrocarbon</li> </ul>	<ul style="list-style-type: none"> <li>• Non-flammable, non-VOC*</li> <li>• Liquid processing               <ul style="list-style-type: none"> <li>- Most conversions use existing equipment</li> <li>- Excellent foam physical quality/ cell structure</li> </ul> </li> <li>• Reduced in-place density</li> <li>• Superior dimensional stability</li> <li>• Improved adhesion</li> <li>• Superior thermal performance</li> <li>• Lowest foam thermal conductivity (highest R-Value) of any zero ODP blowing agent               <ul style="list-style-type: none"> <li>- Thinner profiles and new product designs can be achieved</li> </ul> </li> </ul>

\* By US federal regulations

## Honeywell Specialty Materials

Fluorine Products  
101 Columbia Road  
Morristown, NJ 07962  
Phone: 1-800-951-1527  
email: [enovate.customer@honeywell.com](mailto:enovate.customer@honeywell.com)  
[www.honeywell.com/enovate](http://www.honeywell.com/enovate)

**Demand Honeywell Enovate® for your products.**

# Honeywell

September 2007  
Printed in U.S.A.  
© 2007 Honeywell International Inc.