

## Cost-Effective Replacements for HCFC-141b in Panel Insulation

Honeywell, Blowing Agent Technology Leader for 70+ Years

Honeywell has been at the forefront of blowing agent technology for decades, first offering chlorofluorocarbons like CFC-11, followed by HCFC-141b.

Honeywell's Enovate® 245fa (HFC-245fa), part of the third-generation hydrofluorocarbons (HFCs), has long been considered a standard in the foam insulation industry. It has a global-warming-potential (GWP) of 858.

In 2014, Honeywell introduced Solstice® Liquid Blowing Agent (HFO-1233zd(E)), based on hydrofluoro-olefin (HFO) technology, which retained all the positive attributes of Enovate 245fa, but boasts a GWP of 1, which is 99.9 percent lower than HFCs and equal to carbon dioxide.

### Cost-Effective Solutions, Available Today, Offer Equal or Better Performance

Honeywell has tested the following blowing agents for panel foam insulation to replace HCFC-141b. Review the information below to evaluate the results and find the solution that best matches your requirements.

### Thermal Conductivity of Foam with Various Blowing Agents

	HCFC- 141b	Solstice® LBA	Enovate® 245fa	Cyclo-pentane (CP)	65/35 LBA/CP	85/15 LBA/n-pentane	95/5 245fa/methyl formate (MF)	60/40 245fa/CP
$\lambda$ (mW/mK)								
4°C	18.32	18.20	18.86	20.48	18.79	18.91	19.11	19.66
24°C	19.93	20.49	21.28	22.38	20.79	21.17	21.42	21.93
Flammability*	Nonflammable	Nonflammable	Nonflammable	Flammable	Flammable	Flammable	Nonflammable**	Flammable

Based on generic formulations. Results will vary by formulation. Note: Blend ratios are shown as weight percent.

\* Flammability test methods: OSHA 29CFR1910.1200/DOT 49CFR173.120 were used for all samples except the 245fa/MF blend (95/5) which used ASTM procedure D 3278

\*\* Like any non-azeotropic blend of a flammable and a nonflammable fluid, the blend can become flammable if the nonflammable material evaporates from the mixture

- 65/35 weight % LBA/CP has similar performance to Solstice LBA
- At room temperature, 60/40 weight % Enovate 245fa/CP performs almost as well as neat Enovate 245fa
- Dimensional stability is comparable or better than HCFC-141b for all samples at -29°C, 90°C and 70°C/95% relative humidity
- The table above is not intended to be a comprehensive list. Other co-blowing agent options are available such as methylal, isopentane, and pentane mixtures

### Global Environmental Treaty Mandates Product Phaseout

As defined by the Montreal Protocol, Article V countries are being required to phase out their use of HCFC blowing agents, such as HCFC-141b.

In October 2016, delegates to The Montreal Protocol agreed in Kigali, Rwanda to an historic amendment that adds high-GWP HFCs to the Protocol and establishes schedules for their phase down in developed and developing countries.

## Honeywell Technical Services Helps You Develop Optimized Solutions

Our technical service experts, located around the world, provide consulting services that can help you optimize your formulation and recommend materials that can further improve your foam performance.

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### Interested in learning more?

To discuss your formulation requirements or to start a trial with a Honeywell blend today, call 1.800.631.8138 or visit: [www.honeywell-blowingagents.com](http://www.honeywell-blowingagents.com)



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