

BENEFITS THAT COVER YOUR NEEDS...

# Forane<sup>®</sup> FBA 1233zd Blowing Agent

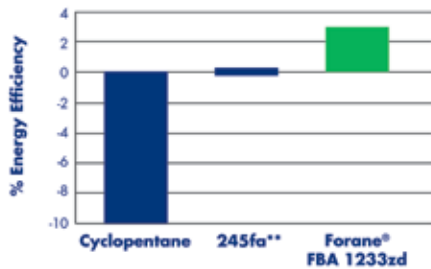


**ENERGY EFFICIENCY**  
**LOW ENVIRONMENTAL IMPACT**  
**SAFETY**  
**EASE OF USE**



# A Comprehensive Approach to Safely Meet Stricter Global Energy Standards With Low Environmental Impact

## % Energy Efficiency Improvement in Household Refrigerators



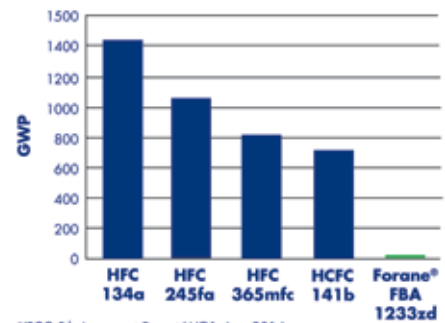
\*Cyclopentane vs 245fa from AHAM trials  
\*\*Commercial trials, unoptimized foam system with Forane® FBA 1233zd vs. HFC 245fa

## Thermal Performance

- Improved energy efficiency in household refrigerators and freezers
- Low lambda ( $\lambda$ ) value for critical cold chain and PU spray foam applications

## Low Environmental Impact

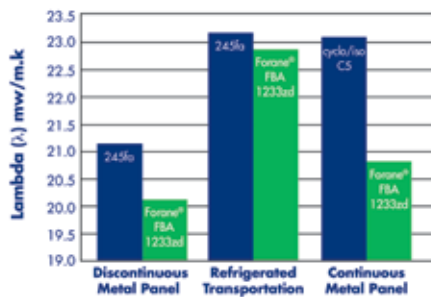
Forane® FBA 1233zd blowing agent has a GWP of 1\*



\*IPCC 5th Assessment Report WG1, Jan. 2014

## Lambda ( $\lambda$ ) for Cold Chain Applications\*

Forane® FBA 1233zd blowing agent provided excellent insulation values at low temperatures critical to all cold chain applications.



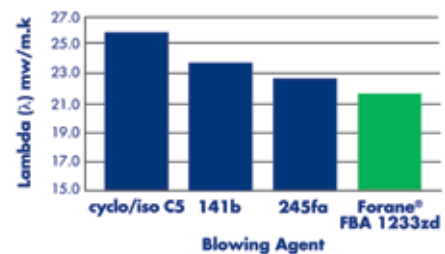
\*Tested @ 75°F Mean Test Temperature

## Low Environmental Impact

- Low global warming potential (GWP of 1)\*, a 99.9% reduction vs. HFC's
- Non-ozone depleting
- VOC exempt. 1233zd is not a volatile organic compound

## Typical Lambda ( $\lambda$ ) of Pour-in-Place Foam

2.5cm thick sample

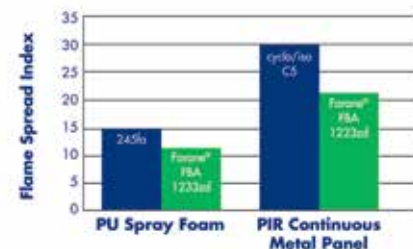


## Safety Performance

- Non-flammable
- Low vapor pressure

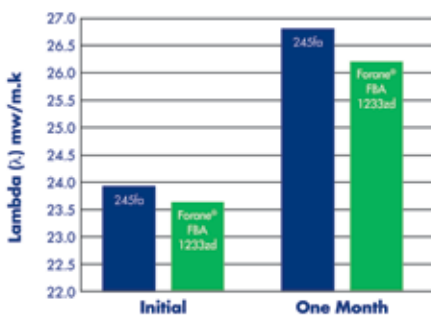
## Fire Performance\*

Forane® FBA 1233zd may allow for lower levels of flame retardants.



\*Spray Foam tested under ASTM E84 guidelines. Continuous Metal Panel burn tested under controlled lab conditions. These tests should not be used to predict burn behavior under actual fire conditions.

## Lambda ( $\lambda$ ) for Spray PUR Foam



## Cost and Ease of Use

- Utilizes existing processing equipment and raw materials
- Easy to use liquid form

Arkema has granted patents on 1233zd use in Foam and Heat Transfer applications throughout the world.

**Benefits That Cover Your Needs... Forane® FBA 1233zd Blowing Agent**

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[forane.com](http://forane.com)

**ARKEMA**  
INNOVATIVE CHEMISTRY

**Headquarters: Arkema France**  
420, rue d'Estienne d'Orves  
92705 Colombes Cedex – France  
Tel.: +33 (0)1 49 00 80 80  
Fax: +33 (0)1 49 00 83 96  
[arkema.com](http://arkema.com)