

# <750 GWP HFO Refrigerants Update

Ozone2Climate Roadshow  
Shanghai, China

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# Search for the Optimal Balance of Properties



# Opteon™ Stationary Portfolio



“XP” = non-flamm; “XL” = 2L mildly flamm



		Low GWP Leading Options			
		Nonflammable Class 1		Mildly Flammable Class 2L	
Current	GWP	Name	GWP	Name	GWP
HFC-134a	1300 (1430)	XP10 (R-513A)	573 (631)	XL10 (R-1234yf)	<1 (4)
HFC-404A	3943 (3922)	XP40 (R-449A)	1282 (1397)	XL40 (R-454A)	238 (239)
		XP44 (R-452A)	1945 (2140)		
HFC-410A	1924 (2088)			XL41 (R-454B)	467 (466)
				XL55 (R-452B)	676 (698)
HCFC-22	1760 (1810)	XP20 (R-449C)	1146 (1251)	XL20 (R-454C)	146 (148)
HCFC-123	79 (77)	XP30 (R-514A)	2 (7)		
		MZ (R-1336mzz(Z))	2 (9)		

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# HFC-134a Replacement – Non-flammable



## Opteon™ XP10 (R-513A) GWP 573 (AR5)

### Optimal Balance of Properties



Meets regulatory requirements

Non-ozone depleting

56% lower GWP vs. R-134a



Azeotropic Blend

No temperature glide



Extends life of existing equipment

Compatible with installed base

Improved capacity w/ comparable energy  
efficiency



Non-flammable, Low Toxicity (A1)



Commercially available & OEM Approved

# Opteon™ XP10 (R-513A) – OEM Adoption



## Johnson Controls Inc. announces Compatibility of their 134a YORK Chillers with XP10



### Johnson Controls Advances Environmental Sustainability with Chiller Platforms Compatible with Low GWP Refrigerants

**MILWAUKEE** – (Jan. 20, 2016) – [Johnson Controls](#) is advancing its [White House Council on Environmental Quality commitment](#) by enhancing HFC product lines to be fully compatible with the non-flammable, low-GWP refrigerant – Opteon™ XP10 (R-513A), manufactured by The Chemours Company. York centrifugal and screw chillers ranging from 125 to 6,000 tons (440 to 21,100 kW) are compatible with R-513A.



# Opteon™ XP10 (R-513A) – OEM Adoption



## Trane Offers XP10 for EcoWise Chillers



**Ingersoll Rand Introduces the EcoWise™ Portfolio of Products as Step to Achieve its Global Climate Commitment**

**Davidson, N.C., January 26, 2015** – Ingersoll Rand (NYSE:IR), a world leader in creating comfortable, sustainable and efficient environments, is pleased to announce another milestone in achieving its climate commitment, a roadmap to significantly reduce the environmental impact from its operations and product portfolio by 2030.

Trane Sintesis™ air-cooled chiller is energy efficient and quiet, and offers customers the choice of operating with a next generation, low GWP refrigerant – **Opteon™ XP10 (R-513A)** or with R-134a. Product will be available in North America and Latin America with next generation refrigerant option in June 2015.

# Opteon™ XP10 (R-513A) – OEM Adoption



**DUNHAM-BUSH**

## Dunham-Bush Offers XP10 for DCLCG Chillers

**Chemours™ Opteon™ XP10 Refrigerant Specified by Major Chiller Manufacturer**

**Dunham-Bush specifies Opteon™ XP10 (R-513A) low GWP Refrigerant for DCLCG Series Of High-Efficiency Direct-Driven VFD Water Cooled Centrifugal Chiller**

WILMINGTON, Del., April. 11, 2017 – Chemours Fluorochemicals (Chemours) today announced the selection of **Opteon™ XP10 (R-513A)** low global warming potential (GWP) refrigerant by **Dunham-Bush for use in its DCLCG Series Of High-Efficiency Direct-Driven VFD Water Cooled Centrifugal Chiller for the Asia Pacific market.**





# HCFC-123 Replacement – Non-flammable



## Opteon™ XP30 (R-514A) GWP 2 (AR5) – Non-flammable



Meets Regulations

97% lower GWP than R-123



Non-flammable



Azeotropic blend

No temperature glide



Performance Match to R-123

Comparable in both capacity and efficiency



Extends life of existing equipment

Replaces R-123

Major OEM approval

# Opteon™ XP30 (R-514A) – OEM Adoption



## Trane Announces Opteon™ XP30 for CenTraVac Chillers



**TRANE®**

### Trane Announces Significant Centrifugal Chiller Line Expansion and Services for the United States and Canada

DAVIDSON, N.C., June 15, 2016 – Trane, a leading global provider of indoor comfort solutions and services and a brand of Ingersoll Rand, is expanding its CenTraVac™ centrifugal chiller portfolio for large buildings and industrial applications in the United States and Canada. These additions address customer demand for chillers and services that are efficient, reliable, safe and compliant with current and proposed regulations.

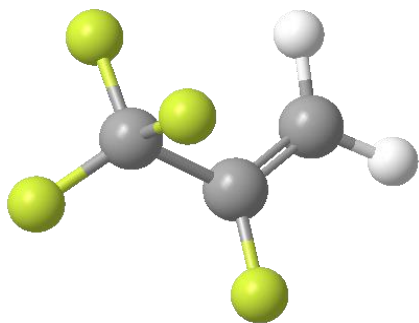
**In 2017, Trane will offer small tonnage CenTraVac chillers for markets like office and municipal buildings with a choice of current, high efficiency refrigerant R-123 or R-514A. R-514A is a next-generation, low global warming potential (GWP) refrigerant from Chemours (Opteon™ XP30).**



# HFC-134a Replacement – 2L flammable

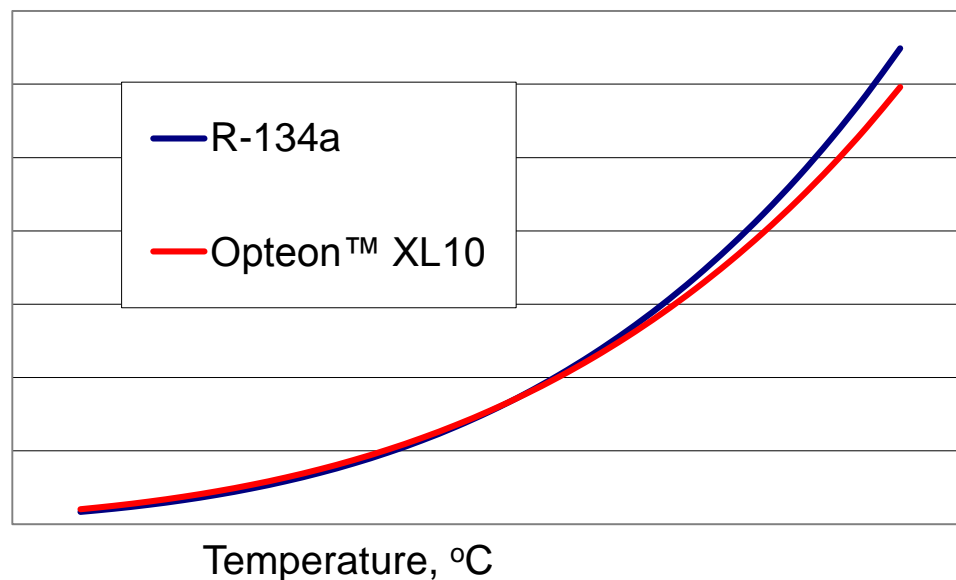
**Opteon™ XL10 (R-1234yf)**  
**GWP 1 (AR5)**

- ✓ Capacity & efficiency similar to R-134a
- ✓ Very low GWP



Pressure, MPa

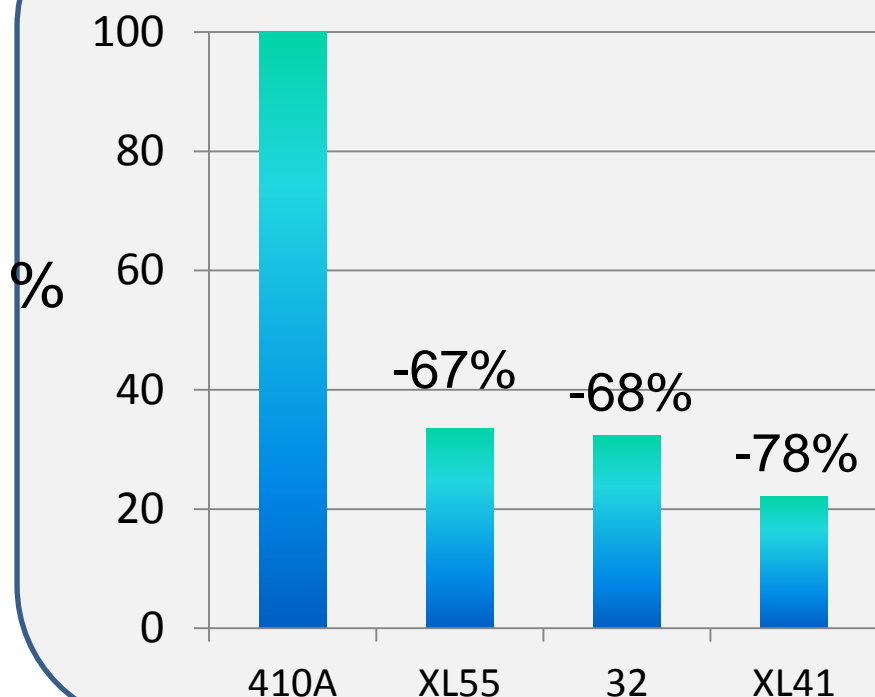
**Vapor Pressure**



# HFC-410A Replacements – 2L flammable



**GWP Reduction**



**Opteon™ XL55 (R-452B)**  
**GWP 676 (AR5) – 2L flammable**

- Most optimized R-410A replacement
- Best fit for R-410A new equipment design
- Best energy performance

**Opteon™ XL41 (R-454B)**  
**GWP 467 (AR5) – 2L flammable**

- Lowest GWP R-410A replacement
- Close match to R-410A
- Good energy performance

# Opteon™ XL55 (R-452B) – OEM Adoption



## Trane Announces Development Activity with XL55 for Air-Cooled Chillers



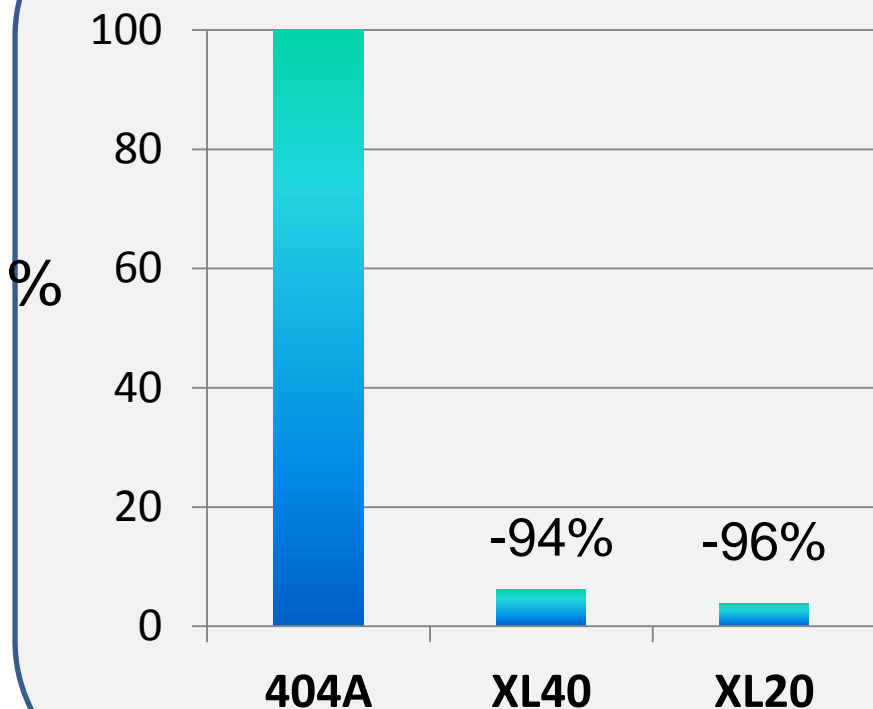
### Trane Exhibits First Air-Cooled Chiller with Climate-Friendly Refrigerant, DR-55 at IIR International Conference of Refrigeration

**Yokohama, Japan, August 16, 2015** – Trane, a leading global provider of indoor comfort and process solutions and services and a brand of Ingersoll Rand, presented the first-ever air-cooled demonstration chiller with next generation, low-global warming potential (GWP) refrigerant, DR-55 at the IIR International Conference of Refrigeration.

# HFC-404A/507/407A Replacements – 2L flammable



## GWP Reduction



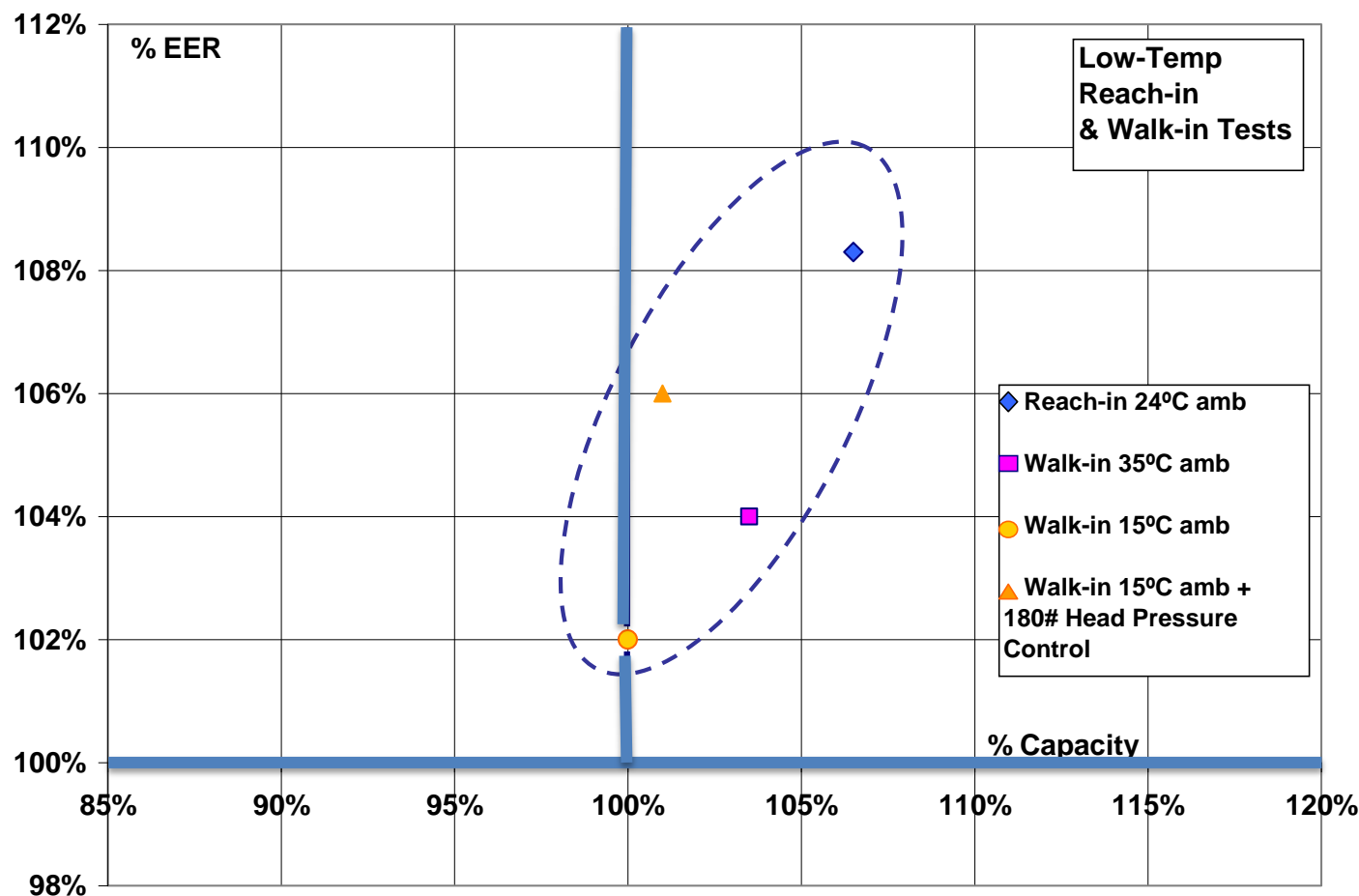
**Opteon™ XL40 (R-454A)**  
**GWP 238 (AR5) – 2L flammable**

- Improved capacity & efficiency
- Close match to R-404A
- Equipment designed for 2L flammable

**Opteon™ XL20 (R-454C)**  
**GWP 148 (AR5) – 2L flammable**

- Lowest GWP < 150
- Suited for R-404A applications
- Equipment designed for 2L flammable

## Low Temp Reach-in & Walk-in Test Results



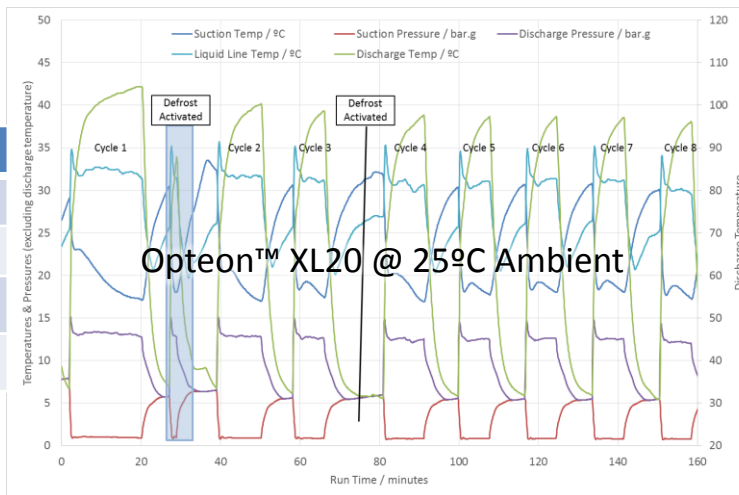
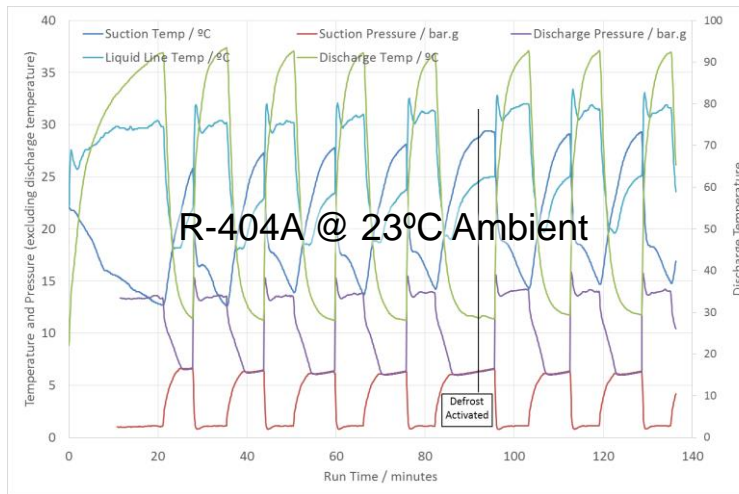
**Energy efficiency and capacity superior to R404A**

# Opteon™ XL20 – Drop-In Test - Capillary

- Reach-in cabinet - 406 liters
- Refrigerant charge 350g R404A
- Secop SC12MLX/104L/2606 hermetic compressor
- Capillary expansion device
- Fan cooled condenser.

Approximate Performance  
Calculated from the Measured Data

Refrigerant	R-404A	Opteon™ XL20
Capacity / kW	0.71	0.65
C.O.P	2.78	2.95
% Capacity $\Delta$ to R-404A	-	-9%
% C.O.P. $\Delta$ to R-404A	-	+6%





# Thank you !