Hall 7A

CHILLVENTA

Chillventa Specialist Forums 2022
Chillventa Fachforen 2022

CONNECTING EXPERTS.

Koura #129

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Koura's Next Generation Refrigerants
Enabling the Industry to Meet Future HFC Phasedowns

Sarah Kim

13.10.2022

Koura

Who we are

Our Legacy

1926 — ICI

We are the largest producer of fluorspar in the world

2001 — INEOS

Our "Mine to Market" structure ensures a secure supply chain for our customers across sectors

2010 — Mexichem FLUOR

2019 — Koura

Koura is a global leader in the development, manufacture and supply of fluoroproducts

Proud member of the **Orbia Community**

Klea® 473A

Koura

orbia

Klea 473A

RAC Cooling Industry Awards 2022 winner for “Refrigeration Innovation of the year: Technology”

Solution for ultra low temperature refrigeration

- Non-flammable
- 85% GWP reduction vs R-23 (14,800)

Available in 2.5 kg (4 L), 10 kg (13.4 L), and 40 kg (60 L)

Applications:

High value cold chain	Pharmaceutical	Test chambers	Medical

Klea 473A

Benefits

- Other proposed options: Highly flammable or high glide (15 – 20 °C)
- Retrofit existing R-23/508B systems
  - Low glide (4°C)
  - Caution needed when charging refrigerant
    - Guidelines and technical support available
- Improved energy efficiency and capacity vs R-23
- Effective to at least -75 °C
- Charge size reduction up to 15%
- Security of supply

Klea 473A

Properties

Composition R-744/1132a/23/125 (60/20/10/10%)

Property	Units	R-23	R-473A
ASHRAE 34 Classification		A1	A1
GWP (AR4)		14800	1830
Relative COP*		100%	98%
Relative Volumetric Capacity*		100%	119.7%
Temperature Glide*	K	0	2.5
Critical Temperature	°C	26.1	29.2
Critical Pressure	kPa	4830	6108
Liquid Density (0°C)	kg/m^3	1035	895
Bubble Pressure (-60°C)	kPa	312	420
Bubble Pressure (-20°C)	kPa	1395	1790

*Thermodynamic cycle calculation conditions: Single-stage, isentropic efficiency 65%, volumetric efficiency 100%, zero pressure drop
Mean evap T = -70°C, Mean cond T = -20°C, Subcool = 5K, SH = 5K

Klea® 473A

+85%
Lower GWP**

Non
flammable

-75°C
effective

Ease of use
Drop in

**Klea 473A v R-23 (14,800 GWP) and R-508 (13,396 GWP)

Klea® 456A

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Klea 456A

Low GWP R-134a replacement

- Non-flammable
- 50% GWP reduction vs R-134a

Commercially available

Successfully servicing R-134a vehicles

Applications:

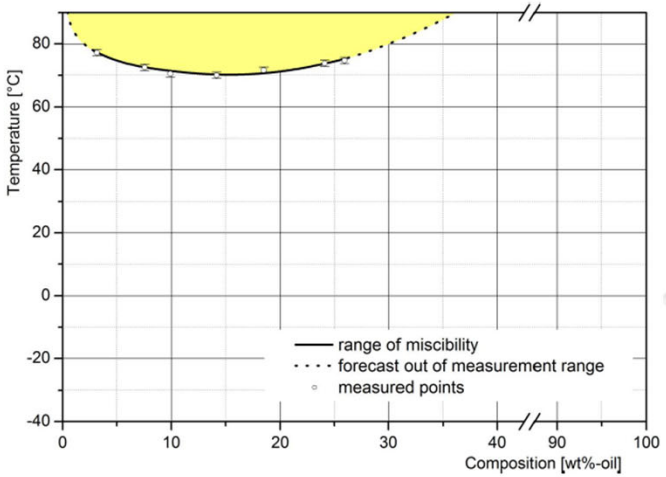
MAC (aftermarket)	Cold chain	Chillers	Heating

Klea 456A

Compatibility & Miscibility

Compatible with R-134a components

- Showed good miscibility with R-1234yf and R-134a compatible oil



Klea 456A

Properties

Composition R-32/134a/1234ze(E) (6/45/49%)

Property	Units	R-134a	R-456A
ASHRAE 34 Classification		A1	A1
GWP(AR4)		1430	687
Relative COP*		100%	99.6%
Relative Volumetric Capacity*		100%	102.3%
Typical Temperature Glide*	K	0	3.8
Liquid Density (20°C)	kg/m^3	1225	1182
Bubble Point	°C	-26.1	-30.8
Saturated Vapor Pressure (20°C)	kPa	572	555

*Thermodynamic cycle calculation conditions: Single-stage, isentropic efficiency 65%, volumetric efficiency 100%, zero pressure drop
Mean evap T = 10°C, Mean cond T = 40°C, Subcool = 5K, SH = 5K

Klea® 456A

50%
Lower GWP**

Non
flammable

>10% cooling
capacity boost

Ease of use
Drop in

**Klea 456A v R-134a
(568 vs. 1430)

R-468C
468B

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R-468B & 468C

Applications:

- Commercial & Residential AC
- Commercial Refrigeration (based on charge size)

Matching properties/performance vs incumbent refrigerants

Property	Units	R410A	R-468C	R407C	R-468B
GWP (AR4)		2088	284	1774	89
ASHRAE classification		A1	A2L	A1	A2L
Composition	%	R-32/125 (50/50)	R-1132a/32/1234yf (6/42/52)	R-32/125/134a (23/25/52)	R-1132a/32/1234yf (6/13/81)
Relative COP*	%	100	101.8 (vs 410A)	100	98.5 (vs 407C)
Relative Capacity*	%	100	82.7 (vs 410A)	100	88.6 (vs 407C)
Temperature Glide*	K	0.1	9	5	10

*Thermodynamic cycle calculation conditions: Single-stage, isentropic efficiency 65%, volumetric efficiency 100%, zero pressure drop
Mean evap T = 10°C, Mean cond T = 40°C, Subcool = 5K, SH = 5K

R-468C

Drop in Performance

- Lowest GWP amongst proposed R-410A replacement options
- 10% higher refrigerant charge with comparable performance vs R-410A
- TXV set to match R-410A's SH in cooling mode, which may have penalized heating performance

Koura's Next Generation Refrigerant Development

- Actively developing thermal solutions with sustainability in mind
- From research to product launch to meet customer's need in compliance with regulatory transitions

Origin
134a

2022
Launching
456A | 473A

2025
New products available
for Electric Vehicle, Heat pumps, HVAC

Advancing the industry to a **sustainable future**

Through our innovation we are leading the way to a **sustainable future**

Thank you

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Visit us at Booth 9-404

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Koura is an Orbia business and part of the Fluorinated Solutions group.

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