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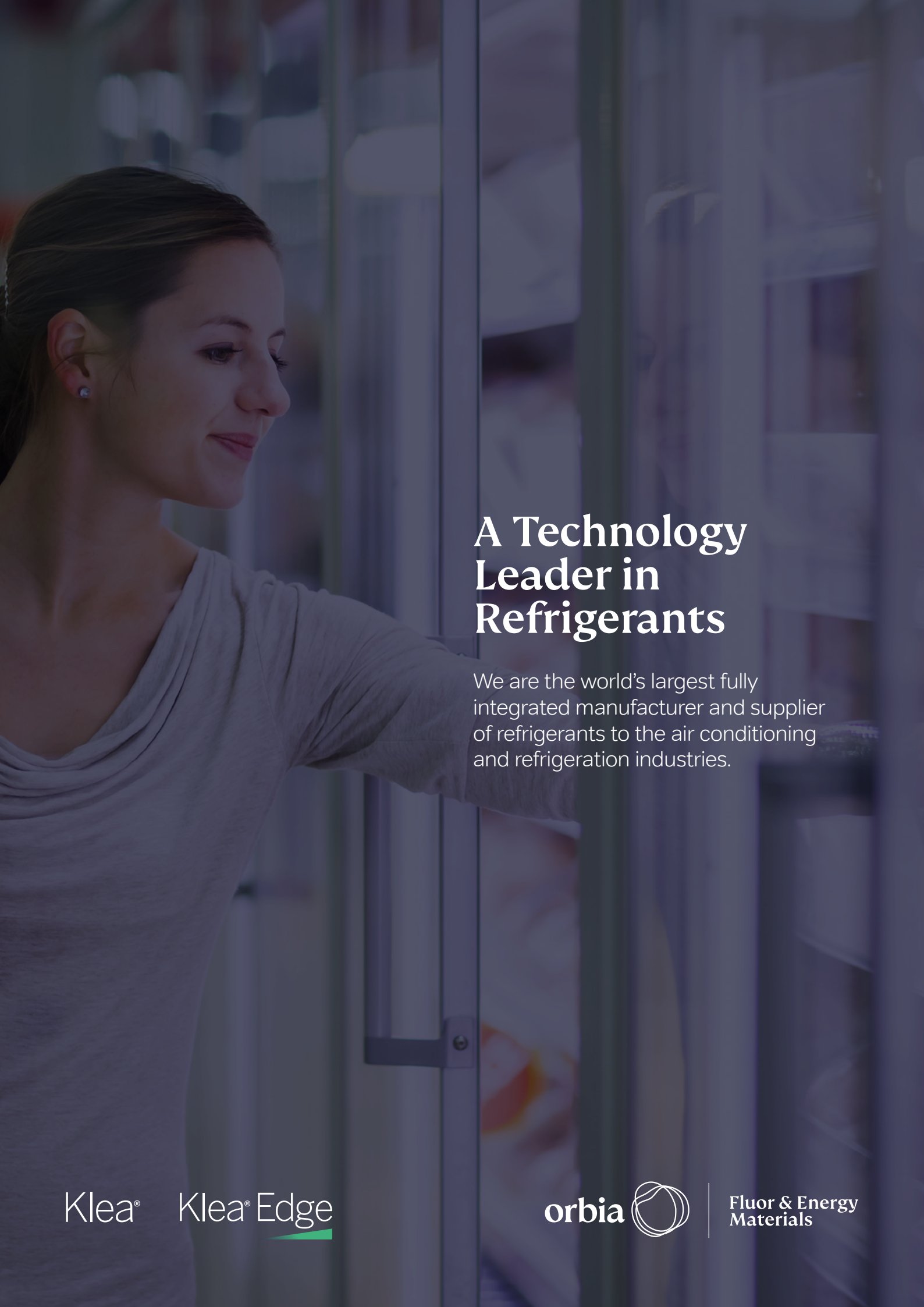
Klea® Klea® Edge

Refrigerants
Quick Guide



A Technology Leader in Refrigerants

We are the world's largest fully integrated manufacturer and supplier of refrigerants to the air conditioning and refrigeration industries.

Klea® Klea® Edge

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Introduction

Building on a proud history of innovation across more than fifty years, we continue to invest in developing lower GWP refrigerant options in order to provide customers with the benefits and characteristics they need.

The relationship we have with our customers is key to our success. Through our dedicated sales and customer service teams we are able to offer the highest standards of customer service to meet the most demanding customer needs across the world.

Products

Click on each product to go to its page.

Air Conditioning

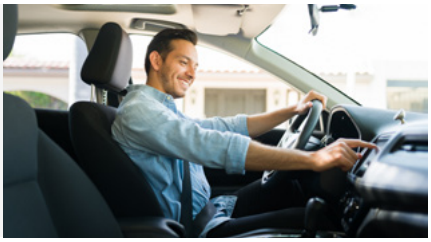
R-32 Refrigerant - Klea® 32
R-407C Refrigerant - Klea® 407C
R-410A Refrigerant - Klea® 410A
R-125 Refrigerant - Klea® 125
R-454B Refrigerant - Klea® 454B

Refrigeration

R-404A Refrigerant - Klea® 404A
R-407A Refrigerant – Klea® 407A
R-473A Refrigerant - Klea® 473A
R-507 Refrigerant - Klea® 507

Automotive

R-134a Refrigerant - Klea® 134a
R-456A Refrigerant - Klea® 456A
R-444A Refrigerant - Klea® Edge™ 444A



Refrigerants Global Product Availability

Click on each product to go to its page.

Products | Regions available	EU	UK	Latam	US	APAC	IN/ME
Air Conditioning						
R-32 Refrigerant - Klea® 32	✓	✓	✓	✓	✓	✓
R-407C Refrigerant - Klea® 407C		✓	✓	✓	✓	✓
R-410A Refrigerant - Klea® 410A	✓	✓	✓	✓	✓	✓
R-125 Refrigerant - Klea® 125		✓	✓	✓	✓	
R-454B Refrigerant - Klea® 454B				✓		
Refrigeration						
R-404A Refrigerant - Klea® 404A		✓	✓	✓	✓	✓
R-407A Refrigerant - Klea® 407A		✓	✓	✓	✓	
R-473A Refrigerant - Klea® 473A	✓	✓		✓	✓	
R-507 Refrigerant - Klea® 507			✓			
Automotive						
R-134a Refrigerant - Klea® 134a	✓	✓	✓	✓	✓	✓
R-456A Refrigerant - Klea® 456A	✓	✓		✓		
R-444A Refrigerant - Klea® Edge™ 444A	✓	✓	✓	✓	✓	

Air Conditioning

A leading air conditioning refrigerant supplier

Our Klea® brand is trusted by major manufacturers and aftermarket professionals the world over.

Our success in the air conditioning industry is built on a long history of product quality, reliability and the very best levels of customer and technical support. Klea® products are approved by major equipment manufacturers and used with confidence by aftermarket professionals across the globe including:

- Hitachi
- Mitsubishi Electric
- Toshiba Carrier
- Fujitsu General

Refrigeration

A world leader in refrigerants

Our Klea® refrigerants are supplied to major manufacturers and a large share of the aftermarket servicing sector across commercial refrigeration, automotive and stationary air conditioning applications.

Automotive

Worldwide leader in automotive refrigerants

Having established the world's first and largest commercial R-134a production plant, our continued success in the automotive sector is built on product quality, reliability and the highest levels of customer and technical support.

That's why Koura's brands are trusted by many of the leading industry names, including:

- Toyota
- Nissan
- Suzuki
- Mazda
- Subaru
- Mitsubishi auto
- Ford
- Jaguar
- Land Rover

As well as a large share of the aftermarket servicing sector around the world.

Air Conditioning

R-32 Refrigerant - Klea® 32

R-32 refrigerant is suggested for use in new air conditioning equipment for residential and commercial use and as a blending component for alternatives to R-22 and R-502, such as Klea® 407C and Klea 410A.

R32 Refrigerant Physical Properties Klea® 32

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	52.02	lbm/lbmol	52.02
Critical Temperature	°C	78.11	°F	172.59
Critical Pressure	bara	57.82	psia	838.61
Critical Density	kg/m^3	424.00	lb/ft^3	26.47
Normal Boiling Point	°C	-51.651	°F	-60.972
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	381.86	BTU$_{IT}$/lb	164.17
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	2.9879	lb/ft^3	0.19
Liquid Vapour Pressure at 25°C	bara	16.896	psia	245.06
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	°C^{-1}	0.00465	°F^{-1}	0.00258
Speed of Sound* for Saturated Vapour at 25°C	m/s	203.72	ft/s	668.37
Adiabatic Exponent* for Saturated Vapour at 25°C		1.68		1.68
Latent Heat of Vapourisation at 25°C	kJ/kg	270.910	BTU$_{IT}$/lb	116.47
Saturated Vapour Density at 25°C	kg/m^3	47.339	lb/ft^3	2.955
Saturated Vapour Density at 0°C	kg/m^3	22.091	lb/ft^3	1.379

*Vapour composition as per bulk refrigerant at dew point.

Air Conditioning

R-407C Refrigerant - Klea® 407C

All of the R-407 series refrigerants are based on blends of the three HFC refrigerants R-32, R-125 and R-134a. R-407C refrigerant has been formulated as a good match to the existing HCFC refrigerant R-22 for use in air conditioning, chilling and refrigeration applications and was the first of the R-22 alternatives to be used on a commercial scale. Suitable for retrofit and original equipment usage. Klea® 407C meets the GWP requirements beyond 2030 under the EU F-Gas Regulations for industrial and commercial refrigeration. Composition (wt%) R-32/R-125/R-134a = 23/25/52. Please note that not all products are available in all markets.

R-407C Refrigerant Physical Properties Klea® 407C

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	86.20	lbm/lbmol	86.20
Critical Temperature	°C	86.03	°F	186.85
Critical Pressure	bara	46.29	psia	671.42
Critical Density	kg/m^3	484.20	lb/ft^3	30.23
Atmospheric Bubble Point	°C	-43.627	°F	-46.5
Atmospheric Dew Point	°C	-36.629	°F	-33.9
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	256.29	BTU$_{IT}$/lb	110.18
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	4.6306	lb/ft^3	0.29
Liquid Vapour Pressure at 25°C	bara	11.903	psia	172.6
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	°C^{-1}	0.0040236	°F^{-1}	0.00224
Speed of Sound* for Saturated Vapour at 25°C	m/s	154.97	ft/s	508.43
Adiabatic Exponent* for Saturated Vapour at 25°C		1.33		1.33
Latent Heat of Vapourisation at 25°C	kJ/kg	188.42	BTU$_{IT}$/lb	81.01
Saturated Vapour Density at 25°C	kg/m^3	43.77	lb/ft^3	2.73
Saturated Vapour Density at 0°C	kg/m^3	19.689	lb/ft^3	1.23

*Vapour composition as per bulk refrigerant at dew point.

Air Conditioning

R-410A Refrigerant - Klea® 410A

R-410A refrigerant is a leading high pressure alternative to R-22, comprising R-32 and R-125, for air conditioning and refrigerant applications for new equipment. Composition (wt%) R-32/R-125 = 50/50. Please note that not all products are available in all markets.

R-410A Refrigerant Physical Properties Klea® 410A

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	72.59	lbm/lbmol	72.59
Critical Temperature	°C	71.35	°F	160.43
Critical Pressure	bara	49.02	psia	710.96
Critical Density	kg/m^3	459.53	lb/ft^3	28.69
Atmospheric Bubble Point	°C	-51.443	°F	-60.6
Atmospheric Dew Point	°C	-51.364	°F	-60.5
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	279.12	BTU$_{IT}$/lb	120.00
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	4.1742	lb/ft^3	0.26
Liquid Vapour Pressure at 25°C	bara	16.574	psia	240.4
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	°C^{-1}	0.0051708	°F^{-1}	0.00287
Speed of Sound* for Saturated Vapour at 25°C	m/s	161.86	ft/s	531.04
Adiabatic Exponent* for Saturated Vapour at 25°C		1.58		1.58
Latent Heat of Vapourisation at 25°C	kJ/kg	190.6	BTU$_{IT}$/lb	81.94
Saturated Vapour Density at 25°C	kg/m^3	65.972	lb/ft^3	4.12
Saturated Vapour Density at 0°C	kg/m^3	30.576	lb/ft^3	1.91

*Vapour composition as per bulk refrigerant at dew point.

Air Conditioning

R-125 Refrigerant - Klea® 125

R-125 refrigerant is a main building block for blended refrigerants used as replacements for R-502 and R-22. These blends include Klea® 410A which has become a leading replacement for R-22, Klea® 407C which was one of the first commercially available blends suitable for both retrofit and original equipment use of R-22 systems and Klea® 407A, a lower GWP alternative to Klea® 404A and Klea® 507. Please note that not all products are available in all markets.

R-125 Refrigerant Physical Properties Klea® 125

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	120.02	lbm/lbmol	120.02
Critical Temperature	°C	66.02	°F	150.84
Critical Pressure	bara	36.18	psia	671.42
Critical Density	kg/m^3	573.58	lb/ft^3	30.23
Normal Boiling Point	°C	-48.089	°F	-46.5
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	164.1	BTU$_{IT}$/lb	70.55
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	6.79	lb/ft^3	0.42
Liquid Vapour Pressure at 25°C	bara	13.779	psia	199.85
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	°C^{-1}	0.0055069	°F^{-1}	0.00306
Speed of Sound* for Saturated Vapour at 25°C	m/s	117.32	ft/s	384.91
Adiabatic Exponent* for Saturated Vapour at 25°C		1.36		1.36
Latent Heat of Vapourisation at 25°C	kJ/kg	110.390	BTU$_{IT}$/lb	47.46
Saturated Vapour Density at 25°C	kg/m^3	90.557	lb/ft^3	5.653
Saturated Vapour Density at 0°C	kg/m^3	42.070	lb/ft^3	2.626

*Vapour composition as per bulk refrigerant at dew point.

Air Conditioning

R-454B Refrigerant - Klea® 454B

R-454B is a high-performing, lower GWP alternative to R-410A that is ideal for direct expansion air conditioning, heat pump and chiller applications. R-454B's excellent balance of properties make it a cost-effective and simple process to apply in new HVAC equipment with minimal changes from R-410A design. Key benefits include:

- GWP reduction of 78% over R-410A
- Simple conversion with minimal changes from R-410A system design

R-454B provides excellent performance in normal and high ambient conditions, a low temperature glide with easy top off after leakage, and is miscible with polyester (POE) lubricants.

R-454B Refrigerant Physical Properties Klea® 454B

ASHRAE Number	R-454B
Composition Weight %	R-32/R-1234yf 68.9/31.1
Molecular Weight	62.6 g/mol
Normal Boiling Point[1]	-50.5 °C (-58.9 °F)
Critical Pressure	51.6 barg / 749 psig
Critical Temperature	78.1 oC (172.6 oF)
Liquid Density at 21.1 °C (70 °F)	1001.0 kg/m^3 (62.5 lb/ft^3)
Ozone Depletion Potential (CFC-11 = 1.0)	0
AR4 GWP (CO_2 = 1.0)	466
ASHRAE Safety Classification	A2L
Temperature Glide	1.5 K (2.7 °F)
Lower Flammability Limit[2]	11.5 vol%

1. Normal bubble point

2. ASHRAE Standard 34 - 2022 Addendum a

Refrigeration

R-404A Refrigerant - Klea® 404A

R-404A refrigerant is an established alternative to R-22 and R-502. Composition (wt%) R-143a/R-125/R-134a = 52/44/4. Please note that not all products are available in all markets.

R-404A Refrigerant Physical Properties Klea® 404A

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	97.60	lbm/lbmol	97.60
Critical Temperature	°C	72.05	°F	161.68
Critical Pressure	bara	37.29	psia	540.83
Critical Density	kg/m^3	486.54	lb/ft^3	30.37
Atmospheric Bubble Point	°C	-46.2	°F	-51.2
Atmospheric Dew Point	°C	-45.5	°F	-49.8
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	199.61	BTU$_{IT}$/lb	85.82
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	5.48	lb/ft^3	0.34
Liquid Vapour Pressure at 25°C	bara	12.5	psia	182.0
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	°C^{-1}	0.00495	°F^{-1}	0.00275
Speed of Sound* for Saturated Vapour at 25°C	m/s	133.8	ft/s	438.94
Adiabatic Exponent* for Saturated Vapour at 25°C		1.37		1.37
Latent Heat of Vapourisation at 25°C	kJ/kg	138.99	BTU$_{IT}$/lb	59.75
Saturated Vapour Density at 25°C	kg/m^3	65.27	lb/ft^3	4.07
Saturated Vapour Density at 0°C	kg/m^3	30.47	lb/ft^3	1.90

*Vapour composition as per bulk refrigerant at dew point.

Refrigeration

R-407A Refrigerant - Klea® 407A

R-407A refrigerant is an energy efficient, low GWP refrigerant designed for use in medium and low temperature supermarket applications. It is suitable for new installations and retrofits on existing R-22, R-507 and R-404A units. Klea® 407A meets the GWP requirements beyond 2030 under the EU F-Gas Regulations for industrial and commercial refrigeration.

R-407A Refrigerant Physical Properties Klea® 407A

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	90.11	lbm/lbmol	90.11
Critical Temperature	°C	82.26	°F	180.06
Critical Pressure	bara	45.15	psia	654.87
Critical Density	kg/m^3	498.86	lb/ft^3	31.14
Atmospheric Bubble Point	°C	-45.007	°F	-49.0
Atmospheric Dew Point	°C	-38.593	°F	-37.5
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	238.36	BTU$_{IT}$/lb	102.48
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	4.8824	lb/ft^3	0.30
Liquid Vapour Pressure at 25°C	bara	12.531	psia	181.7
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	°C^{-1}	0.0042611	°F^{-1}	0.00237
Speed of Sound* for Saturated Vapour at 25°C	m/s	149.33	ft/s	489.93
Adiabatic Exponent* for Saturated Vapour at 25°C		1.34		1.34
Latent Heat of Vapourisation at 25°C	kJ/kg	172.17	BTU$_{IT}$/lb	74.02
Saturated Vapour Density at 25°C	kg/m^3	49.749	lb/ft^3	3.11
Saturated Vapour Density at 0°C	kg/m^3	22.441	lb/ft^3	1.40

*Vapour composition as per bulk refrigerant at dew point.

Refrigeration

R-473A Refrigerant - Klea® 473A

Klea® 473A is an ultra-low temperature refrigerant designed to achieve high performance with a significantly lower global warming potential to support the increasing demand across the industry for applications including high value cold chain, medical, pharmaceutical and test chambers.

R-473A Refrigerant Physical Properties Klea® 473A

Property	Units	Klea® 473A
Global Warming Potential (AR 4)		1,830
Molecular mass	g/mol	52.59
Critical temperature*	°C	29.7
Critical pressure*	kPa	6287
Liquid density (0°C)	kg/m^3	907
Bubble pressure (-60°C)	kPa	423
Bubble pressure (-20°C)	kPa	1811
Isentropic index (Cp/Cv) (at 0°C/300kPa)	---	1.27
Latent heat at -60°C	kJ/kg	301
Typical temprerature glide @2bara, -75C evaporating	K	3.5

*Vapour composition as per bulk refrigerant at dew point.

Refrigeration

R-507 Refrigerant - Klea® 507

R-507 refrigerant is a viable alternative to R-22 and R-502 for new and retrofit applications, Klea® 507 offers good benefits in flooded systems. Composition (wt%) R-125/R-143a = 50/50. Please note that not all products are available in all markets.

R-507 Refrigerant Physical Properties Klea® 507

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	98.86	lbm/lbmol	98.86
Critical Temperature	°C	70.62	°F	159.11
Critical Pressure	bara	37.05	psia	537.36
Critical Density	kg/m^3	490.77	lb/ft^3	30.64
Atmospheric Bubble Point	°C	-46.741	°F	-52.1
Atmospheric Dew Point	°C	-46.741	°F	-52.1
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	196.8	BTU_{IT}/lb	84.61
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	5.5861	lb/ft^3	0.35
Liquid Vapour Pressure at 25°C	bara	12.826	psia	186.0
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	$°C^{-1}$	0.0050859	$°F^{-1}$	0.00283
Speed of Sound* for Saturated Vapour at 25°C	m/s	131.85	ft/s	432.58
Adiabatic Exponent* for Saturated Vapour at 25°C		1.38		1.38
Latent Heat of Vapourisation at 25°C	kJ/kg	135.76	BTU_{IT}/lb	58.37
Saturated Vapour Density at 25°C	kg/m^3	68.888	lb/ft^3	4.30
Saturated Vapour Density at 0°C	kg/m^3	32.251	lb/ft^3	2.01

*Vapour composition as per bulk refrigerant at dew point.

Automotive

R-134a Refrigerant - Klea® 134a

R-134a is used widely in automotive aftermarket vehicles. It can also be used in hybrid cascade systems for supermarkets and is being used in some of the HFO blends in order to bring lower flammability and better efficiency.

Physical Properties - Klea® 134a

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	102.03	lbm/lbmol	102.03
Critical Temperature	°C	101.06	°F	213.91
Critical Pressure	bara	40.59	psia	588.75
Critical Density	kg/m^3	511.90	lb/ft^3	31.96
Normal Boiling Point	°C	-26.074	°F	-14.933
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	216.97	BTU_{IT}/lb	93.28
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	5.2581	lb/ft^3	0.33
Liquid Vapour Pressure at 25°C	bara	6.6538	psia	96.51
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	$°C^{-1}$	0.0032364	$°F^{-1}$	0.00180
Speed of Sound* for Saturated Vapour at 25°C	m/s	144.26	ft/s	473.29
Adiabatic Exponent* for Saturated Vapour at 25°C		1.23		1.23
Latent Heat of Vapourisation at 25°C	kJ/kg	177.780	BTU_{IT}/lb	76.43
Saturated Vapour Density at 25°C	kg/m^3	32.350	lb/ft^3	2.020
Saturated Vapour Density at 0°C	kg/m^3	14.428	lb/ft^3	0.901

* Vapour composition as per bulk refrigerant at dew point

Automotive

R-456A Refrigerant - Klea® 456A

Klea® 456A is our direct replacement for R-134a for the automotive aftermarket. 456A extends refrigerant availability* with 50%** of the global warming potential of R-134a. Compatible with R-134a servicing equipment, Klea® 456A's ease of use and low GWP supports the ever-increasing demand for sustainable solutions.

Physical Properties - Klea® 456A

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	101.42	lbm/lbmol	101.42
Critical Temperature	°C	102.1	°F	215.9
Critical Pressure	bara	41.38	psia	600
Critical Density	kg/m^3	491	lb/ft^3	30.7
Normal Boiling Point	°C	-30.8	°F	-23.4
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	217	BTU_{IT}/lb	93.4
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	5.2	lb/ft^3	0.325
Liquid Vapour Pressure at 25°C	bara	7.36	psia	106.7
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	$°C^1$	0.00323	$°F^{-1}$	0.0018
Speed of Sound* for Saturated Vapour at 25°C	m/s	145	ft/s	477
Adiabatic Exponent* for Saturated Vapour at 25°C		1.22		1.22
Latent Heat of Vapourisation at 25°C	kJ/kg	176	BTU_{IT}/lb	75.8
Saturated Vapour Density at 25°C	kg/m^3	31	lb/ft^3	1.93
Saturated Vapour Density at 0°C	kg/m^3	13.8	lb/ft^3	0.864

*456A allows older vehicles previously charged with R-134a to age gracefully over the vehicle's lifetime.

**456A enables a 50% global warming potential reduction vs R-134a resulting in increased availability in regions with HFC phasedowns.

Automotive

R-444A Refrigerant - Klea® Edge™ 444A

Klea® Edge™ 444A is a direct replacement for R-1234yf for the automotive aftermarket. R-444A is a more economical option than R-1234yf* and cools faster** for enhanced passenger comfort. Klea® Edge™ 444A provides the market options to meet current and future European regulations for carbon emissions, while maintaining ease of use and recovery for service technicians and vehicle owners.

Physical Properties Klea® Edge™ 444A

Property	S.I. Units	Value	British Units	Value
Molecular Weight	kg/kmol	96.7	lbm/lbmol	96.7
Critical Temperature	°C	102.8	°F	217.1
Critical Pressure	bara	41.74	psia	605
Critical Density	kg/m^3	472	lb/ft^3	29.5
Normal Boiling Point	°C	-35.7	°F	-32.3
Latent Heat of Vapourisation at Atmospheric Pressure	kJ/kg	227	BTU$_{IT}$/lb	97.8
Saturated Vapour Density at Atmospheric Pressure	kg/m^3	4.93	lb/ft^3	0.308
Liquid Vapour Pressure at 25°C	bara	8.17	psia	118.4
Coefficient of Volumetric Thermal Expansion for Saturated Liquid at 25°C	°C^1	0.00321	°F^{-1}	0.00178
Speed of Sound* for Saturated Vapour at 25°C	m/s	150	ft/s	493
Adiabatic Exponent* for Saturated Vapour at 25°C		1.21		1.21
Latent Heat of Vapourisation at 25°C	kJ/kg	183	BTU$_{IT}$/lb	78.8
Saturated Vapour Density at 25°C	kg/m^3	28.2	lb/ft^3	1.76
Saturated Vapour Density at 0°C	kg/m^3	12.6	lb/ft^3	0.785

*Based on market conditions as of September 2023.

** Independent test lab data shows an improvement in pull down times

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Klea® Klea® Edge

Disclaimer

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