



COMMITTED TO SHARING OUR EXPERTISE WITH YOU

INTERVIEW

HOW JD COOLING ARE MAKING THE VITAL SHIFT TO LOWER GWP SOLUTIONS

CASE STUDY

TRANE® LEVERAGES SOLSTICE® TECHNOLOGY TO DRIVE COOLING & HEATING INNOVATION

CASE STUDY

BACHARACH MGS400 SERIES: SOLVING LEAK DETECTION EARLY

CASE STUDY

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Refrigerant reclamation is key for refrigerants with GWP > 2500

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Welcome to the 2nd edition of our Climalife UK newsletter dedicated to refrigeration and air conditioning professionals in the UK.

I think we can all agree that 2018 and 2019 have been two very different years! We started in 2018 with the first major reduction in quota of the F-Gas regulation and at the beginning of the year we very carefully controlled the quota and ensured that our customers got all the products they needed which by and large we did successfully.

In theory 2019 should have started in the same way except for the challenge that a significant amount of refrigerant was imported into Europe from China outside of the quota system. This has had ramifications in terms of there being plenty of product available but more importantly it has slowed the transition for the market to move to much lower GWP products.

Despite this the UK has been relatively sheltered from the importation of illegal products but there has been some activity. Many of you will have seen our letter back in June where we highlighted the dangers of taking the opportunity of purchasing products outside of the quota system.

I would again like to highlight the fact that 100% of all of the refrigerants we supply are F-Gas compliant and have been purchased within the scope of quota system.

We as an industry have the direct responsibility to ensure that we comply with the regulation and to stamp out any illegal activity. We have been working closely with DEFRA and the Environment Agency to ensure any illegal activities are reported as those involved in selling or buying product outside of the quota are breaking the main purpose which is to protect the environment by reducing emissions of F-Gases.

Looking ahead to some immediate challenges, the sale and use of virgin R-404A will be banned as from 1st January 2020 for stationary applications with a charge size above 40 CO₂ equivalent tonnes. Many of our customers have been able to retrofit existing systems to lower GWP products but we are aware that there are still many systems in the market that will continue to require service. We are working hard to ensure that we will have sufficient stocks available of reclaimed product to support our customers who will find it difficult to change.

Although just over 1 year away, in 2021 we will see again another significant reduction of 29% compared to 2019, in quota available from the producers of refrigerant. Whilst it is a further big reduction, in theory the F-Gas regulation working in combination with much lower GWP products, should allow the market

to cope because we should remember the quota is based around CO₂ tonnes equivalent. The activity across Europe that we have seen with illegal imports of refrigerant has slowed this transition but we understand that all the European member states have been very active to ensure there are tighter controls to stamp out any illegal activity around refrigerant imports.

This in essence will put the F-Gas regulation and the phase down steps back on track and will ultimately force the industry to move to the much lower GWP products which are available today and are on stock – if the industry continues to be slow in the transition phase then ultimately what will happen is that there will not be enough product in the market to supply the demand.

We however will continue to work hard with all of our customers so that at the very least we will ensure we have the right products and availability to meet your business needs and beyond.

I hope you enjoy the content of our newsletter and we would welcome any ideas or suggestions to improve or specific topics you would like to hear about. Again, I would like to thank you all for your business and loyalty and I hope to see many of you over the coming months during various events and visits.

Allan

Allan Harper
Managing Director, IDS Climalife UK

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The transition to low GWP refrigerants is well under way... we need to be one step ahead with new equipment

Peter Dinnage, Technical Director, IDS Climalife UK discusses

Refrigerants have been in the legislation spotlight for as long as most people can remember and heavily influences the choice of refrigerant we use. The current F-Gas legislation is nearly five years into a 15 year timeframe phase down to reduce CO₂ equivalent tonnes placed on the market by 79% in 2030 from the 2015 baseline.



Whilst movement was slow for the first two years of the phasedown, 2017 saw some rapid changes with R-404A prices rising exponentially when the first few increases from the producers increased demand, instead of slowing it. Since then the market panic has subsided and prices have softened.

We have seen refrigerants such as R-32, R-448A and R-449A rapidly increase in their popularity, R-1234yf has become the refrigerant of choice in new cars whilst R-1234ze and R-513A have found their way into new chillers. The use of R-744 in new supermarket equipment grows and R-717 is increasingly used in the industrial sector, as old large plant is replaced, although neither can provide the answer for all cooling equipment used in their respective sectors.

With refrigeration and air conditioning equipment attributed to consuming 17% of total electricity demand, energy efficiency is going to be a key topic in the climate change debate as we try to move to a carbon neutral position in the coming years.

As far as we have come already, there is still much more to do to meet each phase down step which occurs at three year intervals. With the next reduction of nearly 30% of the current limit, applying in 2021, it is quite feasible to meet each reduction as long as the market plans ahead and quickens the uptake of much lower GWP refrigerants in new equipment.

“The longer higher GWP refrigerants are used in new equipment, their servicing requirements in future years will impact upon quota demands and thought needs to be given to price and availability towards the end of equipment life in 10-15 years’ time.”

For some equipment there may not be an alternative, but equipment and compressor manufacturers are bringing to market their products approved with lower GWP refrigerants. In the next 12 months we will see this rapidly increase.

When new refrigerants come to market they need to be thoroughly tested by compressor manufacturers, and equipment manufacturers need to do their own risk assessments. EN378 provides a valuable tool for calculating charge sizes and as many of the very low GWP refrigerants are A2L classified, their flammability also needs to be taken into account. It is therefore easier to go quicker with smaller charge size equipment to A2L refrigerants than larger systems where design and mitigation factors will come more into play.

Already we have seen R-32 with a GWP of 675, start slowly in small charge units, but then rapidly find acceptance in much more equipment, over the last 12 months as user experience and confidence grows for the use of A2L refrigerants. Its use in equipment with larger charge sizes is becoming more frequent. R-452B with a GWP of 698 and R-454B with a GWP of 466 are also both mooted as R-410A alternatives for new equipment. R-466A with a GWP of 733 is still being evaluated by manufacturers and it's suggested it may be available in 2020.

There are still some easy moves to lower GWP that can be made for both new and existing equipment where R-134a may have previously been used. R-513A is a non-flammable azeotropic blend with a GWP of 631, less than half that of R-134a and can provide equivalent performance for chillers and medium temperature applications. R-1234ze is also approved by the majority of chiller manufacturers.

In the last two years we have seen the rapid emergence of R-448A and R-449A, both with a GWP below 1400, as replacements for R-404A with them suitable for new equipment and retrofit. The next step to go to lower GWP is for new equipment to use the A2L refrigerants such as R-454A (GWP 239), R-454C (GWP 148) and R-455A (GWP 148). By 2022 in the commercial sector, new equipment that is hermetically sealed and systems with more than one compressor over 40 kW will need to use a refrigerant with a GWP <150. Some compressors are already available for these refrigerants and case studies exist.

R-454C and R-455A may also find use in some moveable AC units where the GWP < 150 is needed for new equipment from 01/01/2020.

To keep meeting quota reductions, it is not just all about moving to lower GWP refrigerants. Reducing or eliminating leaks can also save money by using less refrigerant and can help keep energy costs down whilst also reducing demand on quota. Many leaks, if found early, can significantly reduce the amount of refrigerant lost.

Don't wait for 2021 to start moving to lower GWP refrigerants just because the pressure may not be as intense as it was in early 2018. We are ready to meet your demand for lower GWP refrigerants.

Offering end users “reliability, efficiency and longevity”: JD Cooling discuss how they are making the vital shift towards lower GWP solutions.



**John Dye Group Chairman
JD Cooling Group**

About JD Cooling

The JD Cooling Group is one of the UK's largest independent suppliers of bespoke state-of-the-art cooling, industrial refrigeration, power and control systems – offering our customers the complete package.

We work with many fresh produce businesses, convenience food manufacturers, aerospace component manufacturers as well some of the UK's largest pharmaceutical, plastics and chemical manufacturers.

With regional offices in King's Lynn, Manchester, Scotland, the South West and the South East, our experienced and dedicated service engineers are on hand 24/7, 365 days a year, throughout the whole of the UK.

What is the biggest challenge in your business today?

Many sectors of the market we all work in have been under severe price pressure from their customers, either directly or indirectly, as cost cutting to meet the major retailers' price expectations filters through the supply chain.

This makes the job of selling well-engineered, high quality installations that will offer the end users reliability, efficiency and longevity, a very difficult one when they are also being offered cheaper capital solutions, which might still meet the short term requirements of their businesses, albeit at a higher operational cost. I think this can perhaps all be summed up in one word, “confidence” and there is very little of it around at the moment.

What is the most important factor when you choose a refrigerant?

Making sure that it is one which will still be viable within the lifetime of the system into which it is being charged. This is of course one of the biggest challenges to us all at this very volatile time for refrigerants.

The most challenging thing about refrigerant selection over the last 20 years, is having to tell clients who have been responsible and moved away from high GWP HFCs or “banned” HCFCs, to “recommended” replacements or “drop-ins”, that these alternatives are now also being phased out, banned, have become ridiculously expensive or just not available. In my opinion, our industry, scientists and government the world over, have not combined in the most effective manner to arrive at where we are today.

Do you think you will be using the new Low GWP A2L Refrigerants?

JD have been using R-32 now for a number of months on pre-charged chillers. This has allowed us to install systems up to 500 kW in capacity with less than 20 kg of a very low GWP refrigerant exposed to potential leakage in any one primary circuit.

For us secondary cooling has been the way forward for most, larger installations for many years, using chillers with primaries of either ammonia, propane or HFCs. The A2L availability will hopefully allow us to offer a cost effective but “future proof” alternative to the naturals.

What advice can you give to companies still using R-404A and R-507 refrigerants?

Remarkably we have actually come across a small number of projects where the client is still being offered new R-404A installations. It is hard to be too condemning of end users who might still be unaware of the problems associated with these refrigerants when you consider the mind boggling array of “R” numbers and “GWPs” that they have been bombarded with over the last decade. It is up to the installer to lead the way by “doing the right thing” when it comes to refrigerant selection. With existing installations we are helping our clients work through this final phase out period by recovering any R-404A remaining in systems after major leakage.

These systems are then retrofitted with the best low GWP alternative to suit the application, thereby allowing the recovered R-404A to be used to maintain remaining “R-404A systems” should they suffer lower levels of refrigerant loss. It is very difficult to come up with a “one size fits all” policy for this very dynamic issue.

Do you think there is enough information about the new A2L refrigerants coming to market? What do you see as the obstacles standing in the way of more companies adopting them?

Like the whole refrigerant market over the last 40 years, there is a need for combined leadership and clarity from manufacturers / suppliers and legislators with regards to utilising A2Ls to their full potential. I don't believe the contracting sector of the supply chain to the potential end users of these refrigerants are well enough informed on how A2Ls can be applied out there in the market place. Perhaps there should also be further work by the producers with legislators to develop a specific category that will apply to certain A2Ls with very low flammability levels.

How important are other products, such as Ammonia, CO₂ and HTFs to the industrial refrigeration industry?

These are vital to ensuring that there are enough “other” refrigerants that take up carbon allowance to go round as we progress with the phase-down of HFC production. Through our forming of JD Industrial Cooling Systems in 2014, the Group have acquired the skills that enable us to deliver the best cooling solution for any particular application, be it direct ammonia, ammonia/CO₂ cascade, or any other natural/secondary refrigerant alternative that best suits our clients' needs, rather than perhaps misapplying a large HFC charged system to an application. These refrigerants offer lower energy consumption and enhanced performance while minimising the overall impact on the global environment, a precious and fragile entity that we are all realising is so threatened by man and man-made substances.

What would be your advice to new refrigeration and air conditioning technicians coming in to the market today?

Many of the next generation of potential engineers and technicians are coming from a situation where they have grown up in front of a screen, either at school, in the home or on the move. We hear lots of stories where certain industries that require physical elements in their skillset are finding it difficult to attract new people into their workplace.

Those who may be considering refrigeration and air conditioning as a career should understand that this industry is highly dependent on technology and that this dependency will continue to grow over the next decade and beyond. There is a very rewarding career awaiting our young people in the HVAC sector and a huge amount of excellent companies out there who are offering fantastic opportunities to anyone interested in pursuing such a career.

Would you recommend Climalife and why?

Climalife have been a long-standing provider of reliable services to the JD Cooling Group for many years. Whilst there have been many companies come and go who have been able to offer short term, low prices and one-off deals for refrigerants, Climalife have been a constant source of reliable, quality products backed up by a second to none technical support network, who not only support their clients with their existing products but who are always leading the way in new alternatives.

JD COOLING - AT A GLANCE



2000
year founded



£30m
annual turnover

Business: JD Cooling Group specialises in the design, installation and maintenance of cooling, industrial refrigeration, HVAC, automation controls and power systems.

Location: UK wide Head office in King's Lynn

Award winning




+More info at:
jdcooling.com

SAFE HANDLING

OUR SAFE HANDLING INFOGRAPHIC WILL SOON BE AVAILABLE AS AN A5 HANDOUT. ASK YOUR LOCAL SALES REPRESENTATIVE FOR YOUR COPY.


Handling refrigerants **safely**




Always fasten cylinders securely when transporting.




Avoid burns, correct PPE must be worn at all times.




Prevent pollution - ensure valves are completely closed.




Keep away from heat sources and direct sunlight to prevent explosions or safety valve damage.




Avoid impact on any cylinders and always handle with care to avoid irreversible damage.

Trane® Leverages Solstice® Technology to Drive Cooling and Heating Innovation



As world-wide demand grows for increasingly efficient products to reduce energy and resource consumption, cooling and heating technology companies are focused on system design that integrates safety, performance and lower environmental impact.

One such business – Trane® – is leading the way in leveraging the performance benefits of Honeywell's Solstice® low Global Warming Potential (GWP) refrigerants to develop a new generation of HVAC-R systems, replacing refrigerants such as R-134a scheduled for phasedown under F-Gas regulations.

The partnership with Honeywell has enabled Trane® to create new process cooling and heating systems focused on combining low environmental impact with enhanced performance. This includes the launch of its new CITY range, which widens the operating map of compact cooling and heating solutions for smaller commercial buildings by successfully integrating Solstice® ze with screw compressor technology.

As part of its Global Climate Commitment, in 2014, the company committed to a 35% reduction of its greenhouse gas (GHG) footprint from its own operations by 2020. To deliver on this goal, the company targeted a 10% increase in energy efficiency from a 2013 baseline – and has achieved the goal two years ahead of schedule.

“By adopting Honeywell's Solstice technology, we have created solutions that improve performance for customers while also improving the environmental impact of refrigerants to the very minimum.”

Erik Van Oossanen, Portfolio Manager, Applied Chillers Europe Trane®



The Needs

- Identify low GWP refrigerants that would meet the exacting requirements of the Ingersoll Rand portfolio of EcoWise products, enabling customers to reduce their GHG footprint and save money without sacrificing performance or safety.
- Successfully integrate the selected refrigerants into new product designs to guarantee equivalent or better performance than predecessor refrigerant and chiller combinations.
- Adopt refrigerants that not only enhance performance but are proven to be safe to use, are non-toxic and non-flammable*.
- Equip customers against the spiralling costs associated with F-Gas HFC phasedown refrigerants, such as R-134a.



The Solution

- Honeywell's new generation HFO refrigerants have been widely adopted by Trane® for its cooling and heating systems. In 2014, Trane® specified Solstice zd (R-1233zd), with a GWP = 1, for its ECTV centrifugal chillers and then went on to integrate Solstice ze (R-1234ze), GWP <1, in 2016 for its screw and magnetic levitation chillers and water-to-water heat pumps.
- In 2018, the company unveiled a breakthrough innovation, harnessing the potential of Solstice ze to widen the operating conditions within the capacity range of scroll compressors to create its new compact CITY cooling and heating offer with screw compressor.
- The new operating conditions reach -12 °C for process application cooling as well as 80 °C for heating purposes.



The Benefits

- Created wider operating maps for Trane® chillers and heat pumps, opening up new product design opportunities, including the new CITY range of HVAC-R products.
- Enhanced system performance in established markets, including data centre applications, and new products for process industries using negative temperature applications, such as food and beverage, replacing natural refrigerants that require significant safety mitigation systems.
- Helped improve overall efficiency, with the potential to lower the total cost of system ownership.
- Provided environmental preferable solutions that are safe and reliable, offering a near zero GWP alternative to natural refrigerants without any of the inherent safety concerns.
- Opened up new process cooling and heating system design innovations, stretching the capacity reach at both ends of the spectrum from 150 kW up to 2800 kW, enabling the introduction of new screw compressor chiller and heat pump systems.

*Solstice ze is non-flammable below 30 °C.

CITY Innovation

Trane® has always taken a leadership position in environmental stewardship by helping building owners meet environmental preferable goals without compromising efficiency, reliability or safety. Now Trane® has developed a new HVAC range for smaller buildings that opens up a new market segment.

Until now, there has been no scroll compressor solution using a <1 GWP refrigerant that could deliver the required capacity. However, the operating map of Solstice® ze has enabled Trane® to launch its new compact CITY cooling and heating solutions based on screw compressor technology, offering products ranging from 150kW–400kW.

There are three CITY concepts:

- **CITY Comfort:** cooling in tight city buildings – the system fits a standard elevator for ease of installation
- **CITY Booster:** a heat pump for water sources at 5–30 °C, including district heating schemes and waste water sources, elevating output temperatures to up to 80 °C, from 67 °C achievable previously.
- **CITY Process:** a dedicated cooling design for process applications down to -12 °C (typically food and drink), overcoming the toxicity and flammability safety concerns associated with 'natural' refrigerants.

The Solstice® Advantage

Solstice® ze

Solstice® ze refrigerant (HFO-1234ze) is an ultra-low GWP alternative to traditional refrigerants for energy-efficient chillers and/or commercial air conditioning in supermarkets and commercial buildings. With a GWP <1 – a 99.9% reduction in direct impact versus R-134a – it also meets key performance, cost effectiveness and safety criteria.

Solstice® zd

Solstice® zd (HFO 1233zd) is a non-flammable, ultra-low GWP replacement for R-123 for low pressure centrifugal chillers, offering better capacity and similar efficiency to R-123. With a GWP=1, this refrigerant also offers great potential in high temperature heat pumps. Major chiller manufacturers have already announced product ranges based on Solstice zd.

Solstice® ze and Solstice® zd do not form TFA during decomposition.



“The use of R-1234ze aligns perfectly with our Climate Commitment while supporting our customers’ sustainability initiatives. In 2014, Ingersoll Rand publicly committed to increase its energy efficiency and reduce greenhouse gas emissions (GHG) related to its operations and products – the adoption of low GWP refrigerants is very important to these environmental goals and also in helping our customers achieve their own targets.”

Erik Van Oossanen, Portfolio Manager, Applied Chillers Europe, Trane®

Honeywell

With its new CITY range, Trane® has created a new HVAC product that stretches the capacity reach of screw compressor technology, thanks to the application of Solstice® ze.

This configuration enables enhanced heating solutions to be delivered, with heat pump output temperatures now elevated to 80 °C – allowing building owners to move away from fossil fuel heating systems.



HEAT TRANSFER FLUIDS

Safety considerations when using a heat transfer fluid in the food/drink processing and storage sector

We talk to Emma Bardolph, Head of Marketing & Business Development at Climalife - Heat Transfer Fluids (HTFs)



Can you tell us a bit more about the role heat transfer fluids play in the food/drink processing and storage sector?

EB: Whether you are cooling or heating a component or a product, providing cold storage or freezing, each has its own specific requirements. The food and drink storage sector has to optimise its thermal installation, in order to extend the life of the production tool and to minimise the carbon footprint.

Heat transfer fluids have long been used in the food and drink sector to provide secondary cooling, most commonly using Ammonia as the primary refrigerant. When HCFC R-22 was banned many of the larger systems were replaced by an Ammonia / Glycol system, with the ammonia cooling the glycol in the secondary system.

Tell us about suitability considerations for heat transfer fluids when used in food processing and storage areas?

EB: The choice of heat transfer fluids for use in food/drink processing and storage areas means you cannot use products that are classified as harmful.

For example, Mono Ethylene Glycol (MEG) even though it is low cost and has excellent heat transfer properties.

Heat transfer fluids are not food additives, nor do they need to be, but they do still need to be suitable for use in food factories.

Different countries may have different approval requirements. We suggest that the heat transfer fluid used has approval from a European country that is recognised.

Do Climalife offer HTFs suitable for the food and drink sector?

EB: Yes. The Greenway® Neo thermal transfer fluids are made from biosourced 1,3 propanediol as well as MPG based fluids such as Friogel® which is authorised for use in this sector by the Public Health Directorate, in compliance with the ANSES (ex AFSSA).

These heat transfer fluids transport energy at temperatures both below the freezing point of water and above, protecting against freezing and corrosion.

Each are formulated with corrosion inhibitors to protect the system and can be diluted depending on the freezing point protection level desired.

Freezing protection in the range of -15°C to -25°C is typical of the strengths that tend to be used although Greenway® Neo has the ability to go to -55°C specifically for use in the food and drink industry.

What safety measures should be taken when using HTFs in a food or drink environment?

EB: For food/drink production and storage areas, Climalife recommends that an installation is designed to avoid and prevent any contact of the heat transfer fluid with food or drink products. Good maintenance and annual testing of the heat transfer fluid is also to be recommended.

However, known contamination or contact of a heat transfer fluid onto or with a food or drink product, even if the fluid is not classified as harmful by the regulations, should render the product unfit for consumption. As a precaution, the contaminated product should be withdrawn from the market as it is not listed as an ingredient in the product and destroyed irrespective of the approval of the fluid.

OUR HTF RANGE



+More info at:

climalife.dehon.com/heat-transfer-fluids

As HTF producers, Climalife has the specialist know how and skills to share with the market.

Across Europe Climalife assists many industrial companies, installers and thermal application professionals in the design, implementation and management of their equipment and installations, offering focused solutions where the thermal transfer fluid can serve the process of the production or conservation of food products.



NEW

Climalife reveal development of its Frionett® range

Highly desirable, intensive dirt removal! The NEW Frionett® cleaning range is here for your cooling and heating equipment!

Cooling and heating for all

The air conditioning, cooling and heating industries, continue to give us technologies that support us all in our daily lives. They include equipment to help us feel more comfortable, enable the longer storage of fresh foods and beverages, preserve medication and keep servers cool in datacentres.



COIL CLEANER

EVAPORATOR CLEANER

CONDENSER CLEANER



Reduce energy consumption

Reducing the amount of energy used in these technologies is a key factor for the wide spread air conditioning, cooling and heating industries. Last summer, we saw record temperatures in many European countries, with air conditioning and refrigeration systems having to work much harder than in previous years.

Indoor and outdoor pollutants can contaminate system components, causing decreased heat exchange and making systems work harder for longer, increasing the electrical energy consumption. So it is essential to clean the working parts of the system, to restore the performance by ensuring optimal heat exchange.

Regularly cleaned equipment = reduced energy consumption.



Saving you time

To help technicians spend less time cleaning and use their time more efficiently, Climalife has developed a new range of products, tailored to different equipment types. These are in addition to and complement our existing cleaning range.

- Frionett® Coil Cleaner
- Frionett® Evaporator Cleaner
- Frionett® Condenser Cleaner



The power of Frionett®

Frionett® gives greater possibilities for cleaning and disinfecting all types of air conditioning, refrigeration and heating systems, helping professionals in their day to day work and meeting their expectations for ease of use, safety and time saving cleaning needs.

ACT NOW!

For better equipment efficiency, NOW is the time to clean the coils, evaporators and condensers of your air conditioning, refrigeration and heating systems.



+More info at:

climalife.dehon.com/reveal-frionett

Low GWP Refrigerants for Existing Equipment

	REFRIGERANT	TRADE NAME	ASHRAE CLASS	GWP (IPCC4)	GWP (IPCC5)
R-404A REPLACEMENTS	R-407A		A1	2107	1923
	R-422A	RS50	A1	1888	1754
	R-407F	Performax® LT	A1	1825	1674
	R-452A	Opteon™ XP44	A1	2140	1945
	R-449A	Opteon™ XP40	A1	1397	1282
	R-448A	Solstice® N40	A1	1387	1273
R-134a REPLACEMENTS	R-450A	Solstice® N13	A1	605	547
	R-513A	Opteon™ XP10	A1	631	573
	R-515B in development		A1	293	299
R-422D REPLACEMENTS	R-438A	Freon™ M099	A1	2265	2059
	R-453A	RS70	A1	1765	1636

Note: Prior to retrofitting check conversion guidelines and safety to make sure the replacement is suitable for your application



Low GWP Refrigerants for New Equipment

REFRIGERANT	TRADE NAME	ASHRAE CLASS	GWP (IPCC4)	GWP (IPCC5)	APPLICATION
R-452A	Opteon™ XP44	A1	2140	1945	Only for transport refrigeration and some small hermetics
R-449A	Opteon™ XP40	A1	1397	1282	MT and LT refrigeration
R-448A	Solstice® N40	A1	1387	1273	MT and LT refrigeration
R-466A In Development	Solstice® N41	A1		696	Stationary A/C
R-513A	Opteon™ XP10	A1	631	573	HT and MT refrigeration, chillers, heat pumps
R-450A	Solstice® N13	A1	605	547	HT and MT refrigeration, chillers, heat pumps
R-515B In Development		A1	293	299	Chiller mid pressure (indoor), chiller high pressure (indoor), heat pump tumble dryers
R-1233zd	Solstice® zd	A1	5	1	Low pressure chillers
R-744	CO ₂	A1	1	1	Supermarket and industrial refrigeration
R-32		A2L	675	677	Air conditioning and heat pumps
R-452B	Opteon™ XL55 Solstice® L41y	A2L	698	676	Air conditioning and heat pumps
R-454B	Opteon™ XL41	A2L	466	467	Air conditioning and heat pumps
R-454A	Opteon™ XL40	A2L	239	238	MT and LT refrigeration
R-454C	Opteon™ XL20	A2L	148	149	MT and LT refrigeration
R-455A	Solstice® L40X	A2L	148	146	MT and LT refrigeration, heat pumps
R-1234yf	Opteon™ yf Solstice® yf	A2L	4	<1	Car AC, chillers, vending, refrigerators
R-1234ze	Solstice® ze	A2L	7	<1	MT, chillers, heat pumps, cascade systems
R-290	Propane	A3	3	3	MT, LT, air conditioning, chillers, small MT hermetics
R-600a	Iso-butane	A3	3	3	Domestic refrigeration, small MT hermetics
R-1270	Propylene	A3	2	2	MT and LT refrigeration, small hermetics
R-717	Ammonia	B2L	0	0	Industrial Refrigeration

The information provided above is given as reference only. It is provided in good faith, and should not be taken to constitute a guarantee on our part or an assumption of our responsibility. Always refer to official manufacturers' data sheets for specific applications.

Practical implementation of low GWP A2L HFO blends in commercial refrigeration

The environmental impact of refrigerants and an ever-changing legislative landscape has driven a transition from chlorofluorocarbons (CFCs) to hydrochlorofluorocarbons (HCFCs) to hydrofluorocarbons (HFCs) and now the HFO blends.

Now, due to regulations such as EU 517/2014 (F-Gas) in the European Union and future regulations from the Kigali agreement, there is a need to change again to lower global warming potential (GWP) products.

Compared to R-404A (GWP 3922), the lower GWP HFO based alternatives range from 45% to 96% reductions in GWP. However, most of the refrigerants with a GWP < 500 have a degree of flammability, which adds complexity to the path forward to achieve the necessary transition required to comply with the F-Gas Regulation phase-down.

Meeting the F-Gas phase-down challenge in commercial refrigeration

UK retailer ASDA formed a team with its refrigeration stakeholders to look at the options available to ensure the business remained compliant and sustainable under the various F-Gas changes.

ASDA saw that there was a degree of urgency in choosing a way forward with the next phase-down step approaching at the end of 2020 and the need for a marked increase in the use of the low GWP (< 300 GWP) refrigerant options across a variety of applications, including Commercial Refrigeration, as shown in the graph below.

A crucial factor was to choose a solution that not only had a lower GWP but also that at least maintained the performance of the products it replaced, with the energy efficiency being particularly important, as increased indirect emissions from increased power consumption will greatly reduce any net gain of lowering the refrigerant GWP.

ASDA was also looking for similar operating characteristics to the common HFCs such as R-404A and R-407F, as well as the A1 HFO blends such as R-448A and R-449A being used to retrofit existing systems.

Chemours suggested Opteon™ XL40 (R-454A), which, as a blend of HFO R-1234yf and R-32, has a GWP of 238, which is low enough to ensure a sustainable future in new equipment. The trade-off for this low GWP is the mild flammability of the refrigerant.

ASDA and its stakeholders decided to trial the refrigerant in an existing system in an authorised access-only zone: the ASDA Merchandising Centre of Excellence (MCE) in Leeds over a six-week period in early 2018. The results from this trial were excellent: no system commissioning settings were changed from the systems' former refrigerant (R-407A) and it was quickly established that it would be possible to raise the target suction set-point to improve efficiency without having a detrimental impact on system performance.

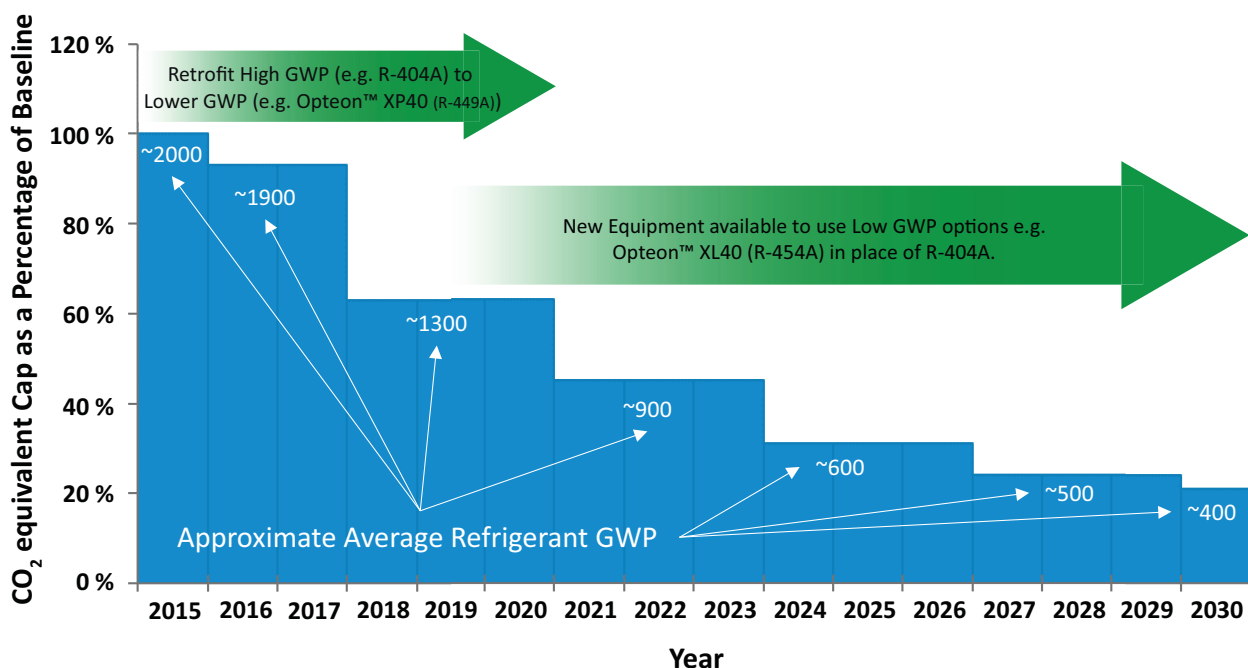
Based on these results, ASDA and its stakeholders moved onto the next stage; a trial in the new MCE at Pentair in Leeds. For this trial a new plant system was designed and developed by Hubbard Products to ensure compliance to ATEX and DSEAR regulations.

Two independent plant systems were incorporated onto a single packaged plant frame – featuring micro-channel condenser technology. The rationale was to ensure that the single plant frame matched the current size and 80kW medium temperature plant capacity – whilst meeting the guidance provided by BS EN-378.

Working with A2L refrigerants

Until 2010, there were three flammability classes recognised i.e.

- no flame propagation (e.g. R-134a),
- flammable (e.g. R-152a) and
- highly flammable (e.g. Propane).



With the need to move to lower GWP refrigerants, it was realised that although many of the low GWP candidates were flammable, a number presented a lower safety risk than R-152a or propane.

A new sub-division of the Class 2 category was added where, in addition to the heat of combustion (HOC) < 19,000 kJ/kg and a lower flammable limit (LFL) of > 0.1 kg/m³ requirements, refrigerants with a burning velocity (BV) < 10 cm/s would be classified as 2L.

The flammability properties of the A2L refrigerants present a significantly lower risk. For example, in addition to the lower burning velocity and heat of combustion, A2L refrigerants require a larger quantity of refrigerant to reach the LFL, the range of flammability is reduced, and the minimum ignition energy required is orders of magnitude larger than that required to ignite an A3 product.

EN 378 : 2016 is now the basis for assessing what is required for the safe use of A2L refrigerants.

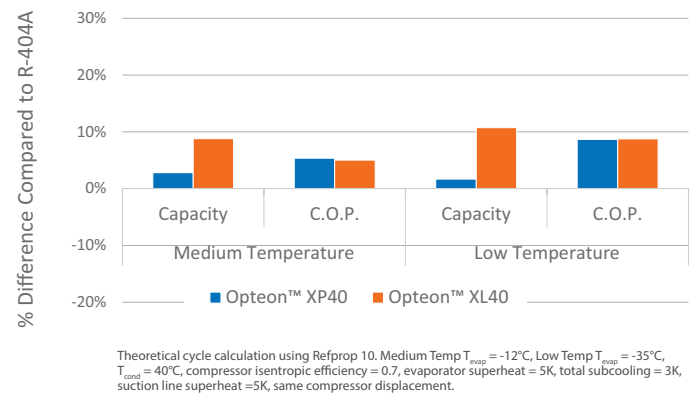
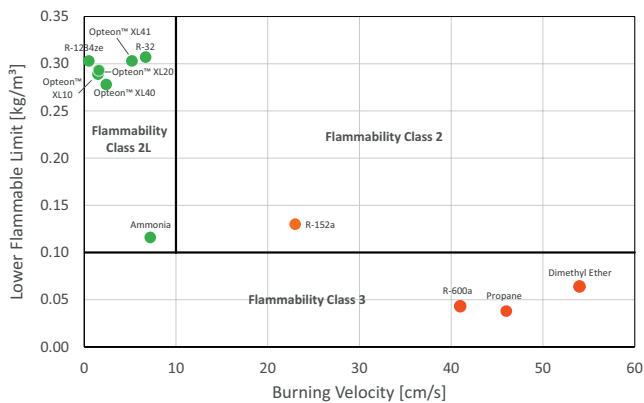
For the ASDA project, individual risk assessments were performed at all stages of use, from design and manufacture, to installation/ decommissioning, maintenance and normal usage stages.

The risk assessment methodology was applied, including ATEX, with help and guidance from Business Edge consultant expertise. The knowledge gained from this process is providing a standard within ASDA and its refrigeration collaborators.

New MCE trial 2019

The trial in the new MCE commenced in February 2019 and consisted of two purpose built packs by Hubbard using compressors supplied by Emerson and approved for use with HFO blend refrigerants.

The packs delivered < 40 kW and contained approx. 50 kg of refrigerant. One pack was run on R-448A, an A1 HFO blend, and the other on Opteon™ XL40 (R-454A). As well as a test of the performance of the A2L refrigerant, the set up was used as a test bed for the risk assessments, including DSEAR, and specifically of the measures to mitigate risk in such a system. These included ventilation, leak detection and developing a shutdown protocol should a leak be detected.



CONCLUSION

ASDA, with the help of Chemours and its other key stakeholders, have developed a commercial refrigeration system that:

- Meets the challenges of the F-Gas phase-down and bans on the use of high GWP refrigerants.
- Is in line with the recommendations of EN378 regarding charge size and system safety.
- Has very low risk by using an A2L refrigerant and implementation of risk mitigation measures that have come from extensive risk assessments.
- Is commercially viable as it uses similar components to traditional HFCs, which also simplifies installation and maintenance.
- Has improved energy performance compared to the HFCs it replaces and to the A1 HFO blends currently used for retrofit, while having a better than 80% reduction in GWP.

- Provides a long term, sustainable solution to small pack commercial refrigeration applications.
- Provides a signpost to other potential end users regarding safe use of A2L refrigerants.

The next steps will be to translate this into a live store environment in the second half of 2019 using all the knowledge from this project.



CASE STUDY

Bacharach MGS400 Series: Solving Leak Detection early

Ultra Refrigeration have been one of the first in the UK to use the new Bacharach MGS400 Series gas detection systems on a CO₂ system. Steve Gatenby, Sales Support Manager at Climalife UK, talks through the project.



The Need

Lincoln Co-op is a new flagship concept store in Lincoln for the Lincolnshire Co-op Group, and they required a leak detection system to be fitted to their CO₂ compressor pack in order to indicate the presence of CO₂ levels which exceed the current safe levels, and to indicate a leak.



The Solution

Ultra Refrigeration, who work closely with the Lincolnshire Co-op Group, contacted Climalife UK, to see which leak detection product would be most suited to this installation. The Bacharach MGS400 series was chosen as it is the latest technological advance in leak detection, and utilises Bluetooth communications for the set-up process, making it quick and easy to be installed at site.



The Product

The MGS400 series is the latest product range from Bacharach and is a complete leak detection solution designed specifically for safety and F-Gas compliance in refrigeration applications. It comprises of three gas detectors, MGS410, MGS450 and MGS460, an 8-channel controller, MGS408, and a smartphone app, connectable to the detectors and controller via Bluetooth.

The MGS410 detector requires connection to the MGS408 controller, or a BMS/BAS via Modbus. The MGS450 and 460 are standalone units, but can be connected to the MGS408 or a BMS/BAS.

All the gas detectors offer integrated audio and visual alarms which comply with safety regulations and maintain performance in temperatures as cold as -40°F (-40°C).

The MGS400 series refrigerant detectors can be connected to a smart phone (Android or iOS) via Bluetooth, using the Bacharach MGS400 app. The app makes commissioning and maintenance intuitive and requires no special tools or training in order to set up the alarm behaviour or thresholds. It also gives the user a real time reading of the PPM levels of the refrigerant being detected.

The MGS408 controller can have a maximum of 8 detectors connected to it, in any combination of MGS410, 450 and 460, allowing the centralised monitoring of several gas detection points.



Installation

The detector was fitted to the CO₂ compressor pack, manufactured by Ultra Refrigeration. The detector was very easy to install and only required a few electrical connections including power and outputs. Set up was simple via Bluetooth and the MGS400 app.

Anthony Lomas, Operations Director at Ultra Refrigeration had the following words to say about the MGS400 system;

"We've just finished set-up and commissioning of our second device which has now become a standard on our CO₂ packs for Lincolnshire Co-op Group.

The integrated alarm provides a reliable warning for persons entering the plant room should CO₂ be present, and connection to the site's RDM DM Touch means we can remotely monitor the system for pending failures due to leaks, even if very small and not posing a safety issue.

Set up using the Bluetooth connection and iPhone app was a breeze and simplified the whole process. Aside from learning how to make the initial connection, there was no need to consult the installation manual or to navigate a complicated parameter list."



The Importance of Leak Detection

Whether it's for safety, to maintain optimal energy efficiency, minimise the cost of refrigerant loss, or to comply with legislation such as F-Gas, there has never been so many compelling reasons to find leaks and fix them early and quickly.

Modern refrigeration systems are designed to be efficient and leak free, but improper installation, inadvertent damage or mechanical wear can result in potentially hazardous refrigerant leaks, which in some cases, could also be flammable.

Climalife UK sell a range of fixed leak detectors from Bacharach to suit most refrigerants and systems. Bacharach are specialists in the manufacture of products that detect, measure and monitor gases with both portable and fixed instruments.



+More info at:
climalife.co.uk

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WORLD REFRIGERATION DAY



VOILES DU FROID



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DON'T FORGET!!

We are here from 8:30am - 4:45pm, Monday - Friday
Call: 0117 980 2520

Tips for handling and storing lubricants

OUR LUBRICANT RANGE

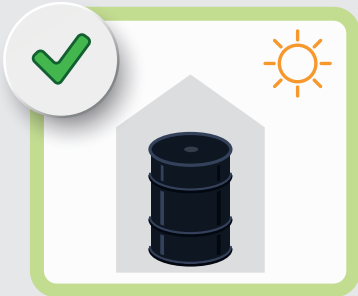


+More info at:

climalife.dehon.com/oils



ANY QUESTIONS? TALK TO US! We are here from 8:30am - 4:45pm, Monday - Friday | Call: 0117 980 2520



Store drums and cans inside; away from direct sunlight and moisture

With good storage conditions, unopened, you can store the oil up to 2 to 4 years (dependent on the brand, type and manufacturer).



Good practice for outside storage

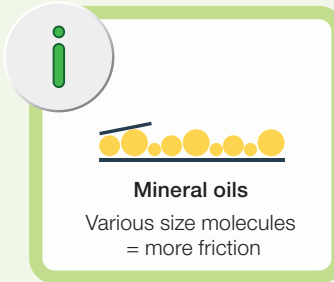
If you can't store your cans inside, be careful on how you store them outside:

Ensure the plug is in to avoid a risk of water infiltration.

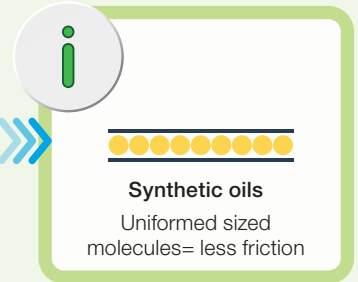
Lay the drums down or tilt them so that the inclination allows water to drain away.



Avoid vertical storage – risk of water infiltration inside the drum.



Mineral oils
Various size molecules
= more friction



Synthetic oils
Uniform sized molecules = less friction

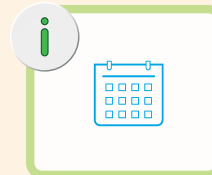
Synthetic oils have numerous advantages, such as their longevity (longer drain intervals), and improved performance.



Some synthetic oils can also be highly hygroscopic = it is recommended that once opened, it should be used as quickly as possible to prevent moisture getting into the system.

Climalife offer a wide range of package sizes to meet your needs.

During production, lubricant cans are nitrogen sealed to prevent any exterior component to be introduced in the installation.



Check the condition of your filters after 3 months of draining or refilling.

Expertise in Refrigeration Oils

Offering a wide range of oils specially formulated to perform in extreme temperature environments and suitable for refrigeration compressors using HFO, HFC and natural refrigerants.

The range includes:

- Mobil SHC Gargoyle™ 80 POE
- Mobil Gargoyle™ Arctic SHC™ 200 Series
- Mobil Gargoyle™ Arctic 155 & 300
- Mobil Zerice™ S Series
- Mobil EAL Arctic™ Series
- Mobil Gargoyle™ Arctic 68 NH



Mobil™

Advancing Productivity™

CASE STUDY

OPTEON™ XP10 (R-513A) chosen for Primula's cheese store to meet F-Gas regulations



Star Refrigeration have overseen the replacement of two refrigeration plants serving Primula's principal cheese store facility in Team Valley in Gateshead, near Newcastle.

As well as transitioning the facility from refrigerant R-422D to R-513A, Star also modernised its systems to achieve greater efficiency and reliability. Having worked closely with Primula for over 15 years and already completed an upgrade of the same plant in 2008, Star were well-placed to undertake this project. Star successfully transitioned the plant from R-422D – which will soon become untenable under new F-Gas Regulation – to the more future –proofed R-513A.

The challenge

From January 1st 2020, the EU will introduce a service ban on all refrigerants with a GWP of over 2,500 for stationary refrigeration systems with a charge greater than 40 CO₂ equivalent tonnes. Since R-422D has a GWP of 2,729, it would have become problematic for Primula to continue running their cheese store.

About Primula

Primula is a well-known manufacturer of cheese spread that is popular in over 40 countries in Europe and beyond. The maker of 'a cheese with a difference' are owned by the Kavli Trust, a charitable organisation which each year donates thousands of pounds to supporting research, humanitarian and cultural projects which improve people's lives. This means every time you buy Primula Cheese you are helping to support worthy causes, right here in the UK and across the world.

In the UK, Primula is based at the Team Valley Trading Estate in Gateshead, where its cheese store refrigeration facility, which operates at +4°C is used to store all incoming product prior to processing. The facility is served by two independent refrigeration plants for reasons of resilience, both of which were originally designed for operation with R22 refrigerant. In 2008, Star converted the plants to enable operation with R422D refrigerant which extended the life of the plants by over 10 years. However, with upcoming legislation and the plant's age in mind, Star's advice was to replace the plants with new equipment utilising a refrigerant with a far lower Global Warming Potential (GWP).

This, in conjunction with the age of the plant, prompted Primula to opt for a complete replacement of the two plants to achieve regulatory compliance, optimise efficiency and ensure its viability going forwards.

Primula specified that the facility should retain its two-plant design to maintain resilience, while they also stipulated that each plant should comprise of a single air-cooled condensing unit and four evaporators, with these latter units positioned in the same location as the existing ones to minimise disruption to the current infrastructure of the building. The two air-cooled condensing units were to be located externally and positioned end-to-end, so as not to block pedestrian access on that side of the building. Finally, all work had to be carried out within normal business hours, but had to focus only on one plant at a time to ensure that continuity of operation was maintained with no downtime at all.

The right solution

R-134a has, until recently, been Star's preferred refrigerant choice for this type of application, however recognising the need to move to lower GWP for new equipment, Star discussed the options with Climalife UK. OPTEON™ XP10 (R-513A) was the best suited for these systems due to it being an A1 refrigerant with no flammability and a GWP of just 631 compared to R-134a at 1430. It should also ensure that the plant remains viable for the foreseeable future in line with F-Gas phase down requirements.

The solution involved the supply and installation of two independent plants each comprising a single bespoke manufactured air-cooled condensing unit and four draw-through evaporators. The condensing units incorporate a single semi-hermetic reciprocating compressor mounted within a weatherproof housing and an air-cooled condenser with extended legs designed for vertical air throw.

Given that the work had to be carried out during operational hours, Star scheduled the project to take place in the first quarter of 2019 to take advantage of low ambient temperatures and reduce the workload placed on the one operational plant while the other was being upgraded.

The benefits

Each plant provides 45.9kW of refrigeration capacity and absorbs 15.1kW. Given that the maximum workload of the cheese store is 61kW, each individual unit is capable of meeting almost three-quarters (75%) of the maximum required duty. The additional cooling capacity gives Primula increased efficiency and low operating cost.

Star made every effort to provide a solution that increased Primula's competitive advantage with the use of components that qualified for Enhance Capital Allowance and could afford the customer tax breaks for its use of energy-efficient technology.

In addition, the plant was designed with efficiency in mind and comprised energy saving technology such as electronic expansion valves, condenser EC fans and evaporator controllers equipped with skip-defrost functionality to avoid defrosting operation when unnecessary. It's estimated that this functionality could help the company achieve savings of up to £6,000 per annum.

Finally, the proximity of Star's Newcastle branch at less than 10 miles away from Primula allowed the project to run smoothly, on time and on budget. The branch's seven qualified industrial refrigeration service engineers and two apprentices will ensure the plant is properly maintained for years to come while on hand to respond to any queries or concerns.

The successful supply and installation of the new plant has provided Primula with a reliable, energy-efficient solution which will save them money in the short-term and comply with international legislation in the medium to long term.

Matt Cumming, Facilities Manager at Primula said,

"Star's commitment to ensuring our business is fully compliant with F-gas regulations and their willingness to share their expertise with us helped us installed a commercially viable refrigeration solution which will have considerable benefits both in terms of environmental impact and efficiency. The brand-new installation means we are well-placed to continue to serve the needs of our customers across the UK for years to come".

Refrigerant Reclamation is key for refrigerants with GWP >2500

A good reclamation strategy can ease the transition to low GWP refrigerants

The recovery of HFCs from refrigeration and air conditioning systems is mandatory under the F-Regulation to prevent emissions of high GWP refrigerants to the atmosphere.

From the 1st January 2020 it will be illegal to use virgin refrigerants with a GWP >2500 for servicing stationary refrigeration systems except where the system operates below -50°C or where the system charge is below 40 CO₂ eq tonnes (eg 10.2 kg of R-404A).

Reclaimed or recycled product can still be used for servicing, but the availability of these high GWP refrigerants will be dependent on systems being converted or replaced and demand for reclaimed product not exceeding the amount that comes back for re-processing over the next few years.

Refrigerants with a GWP over 2500 include R-404A, R-507A, R-422A, R-422D, R-428A and R-434A. Whilst it is expected that reclaimed R-404A will be available in 2020, some of the other refrigerants may not be as easy to obtain from all suppliers.

Many of our customers have found that an easy way of creating reclaimed product is to convert existing systems to an alternative lower GWP refrigerant with R-448A and R-449A being the most popular conversion refrigerants, as they are proving easy to use for those familiar with conversion procedures.

The recovered product is then returned to us for reprocessing for re-use as reclaimed product in other systems that may be less practical to convert.

The Reclamation process

All recovered product is returned to our filling plant at Swansea, adhering to the Hazardous waste regulation procedures along with correct documentation, with the site holding a waste licence to reprocess refrigerant.

All recovered refrigerant returned to us is typically out of specification for moisture content, acidity and high boiling residue such as particulates.

After initial analysis to confirm product identity it is re-processed by a combination of distillation, cleaning and drying processes back to AHRI 700 specification which is the same conformity as virgin product. This enables it to be placed on the market as regenerated product and it will perform in exactly the same way as virgin product.

The F-Gas legislation requires that all cylinders containing reclaimed or recycled product must be labelled as such, have a batch number and identify where it was re-processed to facilitate traceability. All F-Gas records that are kept by a user also need to record that reclaimed or recycled product was used and where it came from.

How is Recycling different from Reclamation

Recycling is putting the recovered refrigerant through a basic cleaning process and usually means there is no analysis or quality assurance attached to the product in terms of specification or purity. As a result, it may not perform in the same way as virgin product or reclaimed product and the risk is with those using it. If recycled product leaves the site it was recovered at, a hazardous waste note to transfer it is required.

For peace of mind, best quality and system operation, it is recommended that recovered product is bought back to ARI specification by reclamation. We don't just reprocess high GWP refrigerant but all common A1 HFC refrigerants.

A gradual replacement strategy

With the 2020 bans nearly upon us, if you or your customer does not have a strategy or plan for equipment running on high GWP refrigerant over 2500 GWP it is time to ensure something is put in place very quickly.



+More info at:

climalife.co.uk/waste-management

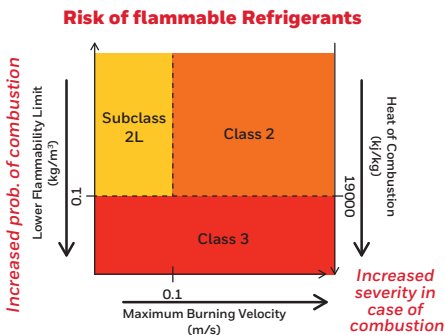
Meet environmental compliance without sacrificing safety

With the global push for use of lower-GWP refrigerants in commercial refrigeration systems, there is also a need to select an alternative to incumbent refrigerants with the highest safety rating.

Manufacturers, contractors and end users are faced with a number of refrigerant choices and safety is very high on their priority list. At first glance, A3 refrigerants like R-290 (propane) or R-600a (isobutane) appear to help meet the growing environmental compliance demands in refrigeration. However, take a deeper look and you'll see there is a much higher risk of flammability and increased burning velocity when choosing an A3 safety classified refrigerant.

Lower overall risk

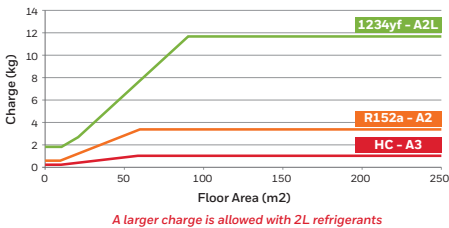
A2L refrigerants have significantly lower toxicity, flammability risk, and burning velocity than A3 refrigerants.



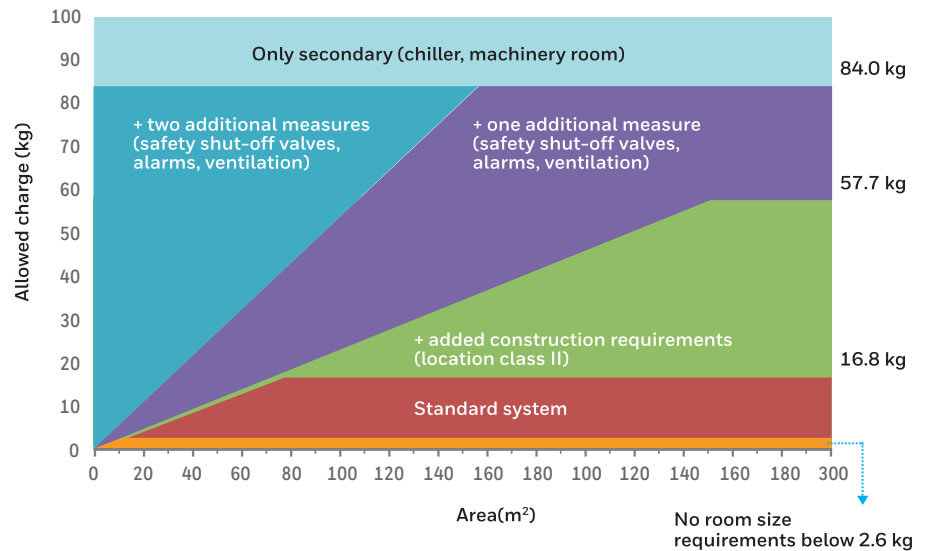
The charge you need

The lower flammability risk and lower burning velocity of A2L refrigerants helps ensure you'll be able to use the ideal charge size for your refrigeration application. The ISO 5149 and EN 378 standards allow a considerable increase in the amount of an A2L that can be safely used in refrigeration when compared to an A3 refrigerant.

Charge Limit Comparison



For example, when using the A2L refrigerant Solstice® L40X (R-455A) in a public space, and taking into account the minimum dimensions of the room, higher refrigerant charges can be used, as shown in the graph below.



A2L refrigerants hit the 'sweet spot' for environmental compliance in refrigeration applications, due to their improved performance, reduced GWP and minimised flammability risk. Typical and popular examples of such A2L refrigerants are:

- Solstice® L40X (R-455A): Ideal for commercial refrigeration applications like condensing units, water-loop and monoblock systems, plug-ins, or chillers.
- Solstice® ze (R-1234ze): Ideal for refrigeration applications like cascades systems and industrial chillers.
- Solstice® yf (R-1234yf): Widely used in mobile air-conditioning systems and in commercial refrigeration applications like vending machines or beverage dispensers.

BEST APPLICATIONS FOR A2L REFRIGERANTS

For the best combination of environmental compliance and reduced flammability risk, A2L refrigerants are the recommended choice for:

Refrigerated display and storage cabinets	Commercial refrigerators	Refrigerated trolley cabinets	Service counters and self-service counters	Monoblock refrigeration units
Blast chillers and blast freezers	Remote condensing units	Industrial process refrigeration	Cold rooms	Convenience stores



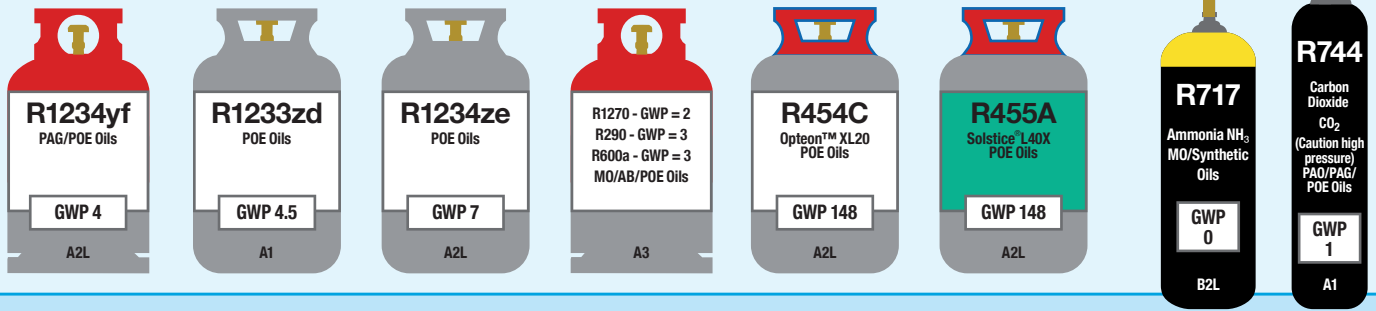
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A2L refrigerants in action

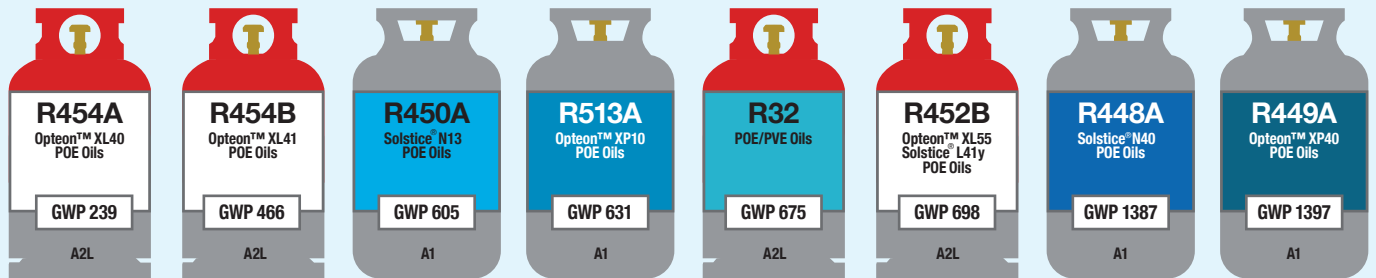
Protect yourselves, your staff, your customers and your business by using refrigerants with a higher safety profile – meet your environmental requirements and improve safety with A2L refrigerants.

Check out the case studies on the Climalife website, to see how manufacturers, contractors and end-users around the world are using A2L refrigerants in commercial refrigeration applications.

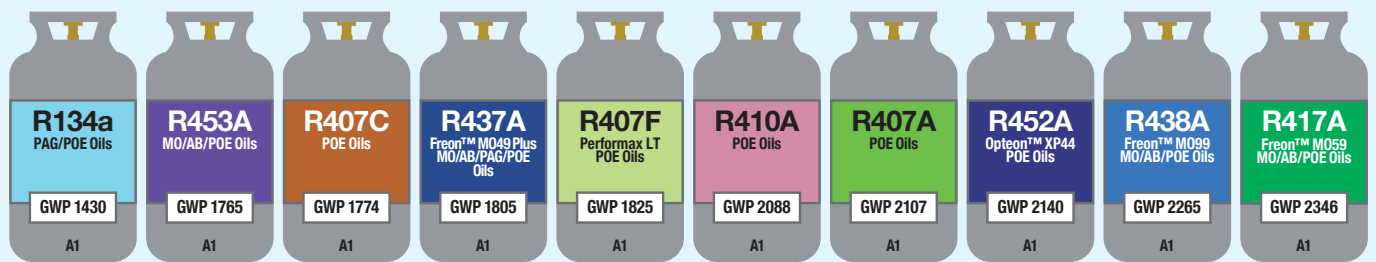
VERY LOW <150



LOW GWP 150-1400

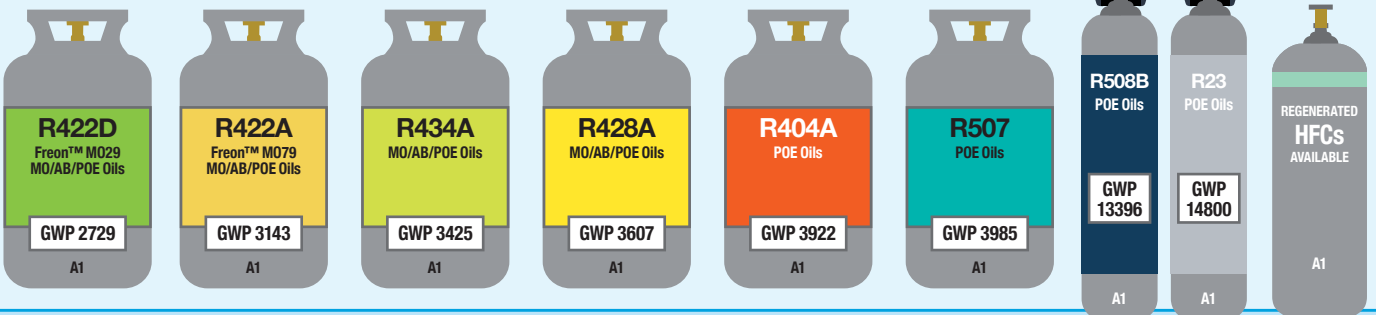


HIGH GWP 1401-2500



VERY HIGH GWP >2500

Consult F-Gas Regulation for bans and allowable uses from 01/01/2020.



OTHER PRODUCTS & SERVICES

- Heat Transfer Fluids
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Need help choosing the right refrigerant to comply with F-Gas regulation EU 517/2014?

...download our **FREE F-Gas Solutions Mobile App!**



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