

The RAC Engineer's Guide to Low GWP Refrigerants

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Finding your way to the right solution



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Contents

04 Introduction from Wolseley's Robert Franklin

08 Mark Hughes of Chemours on A2Ls



10 The Manufacturer's View from Honeywell

12 Daikin on New Air Conditioning Equipment

15 Tecumseh on Sustainable Cooling

18 Regulatory Bans

19 Product Use

20 Where is Your Sector Going?

22 Rob Parker of A-Gas on Reclamation

24 John Ormerod of A-Gas on Working with A2Ls

28 JAVAC's Scott Davies on Safe and Secure Charging Hoses



30 Graeme Fox on Registration

32 Mike Creamer on Training

33 F-Gas Jargon-Buster

35 GWP Summary Table



Years of Great Change



Wolseley Sales Director for Cooling Robert Franklin says help is on hand for installers on how to deal with the latest developments in the F-Gas Regulation.

Change can be unrelenting in the refrigeration industry. We've passed through three years of uncertainty about refrigerant availability, unpredictable pricing and the introduction of new generation gases that are now considered mainstream refrigerants.

Our industry should be praised for its achievements in meeting the low-GWP challenge set out by the F-Gas Regulation.

There's been a huge reduction in the amount of high GWP refrigerant being used and innovation across our supply chain has ensured that the impact of the quota step downs have been cushioned for our customers.

As the step downs continue alternative refrigerants will have a greater role to play. Adopting the benefits of alternative gases like A2Ls will give the industry breathing space to handle what's coming down the road.

The road ahead

The F-Gas Regulation stepped up a gear this year with the hard stop on installing R404A and other high Global Warming Potential (GWP) gases. If you

roll forward into 2021 and 2022 greater change is on the way. In 2021 there's the next stepdown in the F-Gas quota when virgin refrigerant availability will drop by another 29 per cent, on a CO₂ equivalent basis, taking the industry down to 45 per cent of the 2015 baseline level.

In 2022 the bar for the use of virgin HFCs is raised even higher when the threshold drops from 2500 to 150 GWP for hermetically sealed equipment and multipack centralised refrigeration equipment above 40kW. This will really ramp up the pressure on the industry.

This year saw the major refrigerant suppliers saying goodbye to virgin R404A. The good news is that reclaimed R404A can be used up until 2030, regardless of the charge size, and this is now a standard stock item within our branch network.

It is not all doom and gloom for our industry. If users continue to move to the next generation refrigerants our market can still continue to grow. New blends are emerging and with a GWP as low as 4 they appear to be viable alternatives to R404A.



As the industry moves towards using alternative refrigerants a different approach and new ways of working need to be adopted by the contractor.

As a leading distributor of refrigeration and air conditioning products, Wolseley are here to help you navigate the F-Gas maze and make switching refrigerants simple.



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Here to help

Our F-Gas guide has been designed to help you understand the changes, what options are available and how they can be implemented safely.

Please use our guide to aid your decisions, demonstrate your thinking and to help your customers understand the difficulties facing our industry.

We know that climate change is a long-term challenge for our industry to tackle and this is one area that will help to significantly reduce the cooling industry's carbon emissions.

If I could only offer one piece of advice – it would be to look at all the options now and seek expert advice if you are unsure. It is not a time to ignore what's to come and the Wolseley team are here to help.





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A2L Refrigerants



Mark Hughes, Business Development Manager for refrigerants' manufacturer Chemours, on how A2L refrigerants are already making their mark with the major supermarkets.

The major supermarket chains have shown that the new frontier refrigerants mildly-flammable A2Ls, can play a key role in meeting the demands of the F-Gas Regulations.

While some sectors of the refrigeration industry have been slow to respond, the supermarkets have realised that meeting the high GWP challenge is a priority.

Trials and independent studies have taken place which have revealed excellent results in using the A2Ls in large and small store operations.

The supermarkets understand that making the switch to low GWP refrigerants is good for business, as customers demand that their goods and services be produced and delivered in more environmentally-friendly and less wasteful ways.

Store installations

In a trial involving A2Ls and ASDA at a Shell store in Leeds the results were impressive. The system ran on Chemours' Opteon XL40 (R454A) with a GWP of 238. With XL40 the GWP dropped by 94 per cent when compared with using R404A (GWP 3922). The cooling performance was maintained and there was improved energy efficiency.

The results were put to good use in the first live installation of XL40 in a new ASDA store at

Trafford Park, Manchester. In a first for the Co-op, another trial took place at a new convenience store in Derby. This featured an A2L-ready pack running on Opteon XL20 (R454C) with a GWP of 148. The supermarket was looking for the lowest possible GWP alternative to using R404A. Again the A2L did not disappoint and the trial was a success.

Independent study

An independent study on A2Ls involving Wave Refrigeration was also commissioned by Chemours. This revealed that Opteon XL20 and Opteon XL40 could be superb alternatives to high GWP refrigerants in different climates. Comparisons were made on typical supermarket installations in several climates including the moderate temperatures of Leicester and the hot conditions of Seville, Spain. In both cases the results were impressive.

Running costs were lower, there was significantly less impact on the climate and energy costs were also reduced. The study highlighted the fact that Opteon XL refrigerants clearly offered a viable alternative to high GWP gases or natural refrigerant options.

BRA guide to A2Ls

The information gathered through the results of the store trials will be available to contractors in a guide produced by the British Refrigeration Association. This will help engineers with the installation of A2Ls and set out in detail the risk assessment necessary when working with mildly flammables.

Energy efficiency

The Opteon products have been designed to be energy efficient and the trials have shown that they can have a better performance than systems running on hydrocarbons or CO₂. This is because we have blended our products to have the optimum balance of low GWP and energy efficiency. The advantage we have is that we can design products to offer the best performance in a commercial refrigeration situation.

The environment

Opteon XL20 has a GWP of less than 150, while Opteon XL40 has a GWP of less than 240. So, the effects of leaks on the environment are lessened considerably.

The future

Once engineers have an understanding of how to work with A2Ls, I am sure they will become the refrigerant of choice. The systems are cheaper to run and maintain and are here for the long run. The success of R32 in air conditioning systems has shown that A2Ls are very much here to stay and I am sure that will be the case in commercial refrigeration, especially in the areas of store refits, convenience stores and petrol forecourt operations.

In smaller installations A2Ls offer a much cheaper and more effective alternative to CO₂ systems or other natural refrigerants and this is where they can really make an impact from an installer's point of view.

**R454C
(XL20)
<150**

**R454A
(XL40)
<240**



Moving Forward



Tunca Sekban, Honeywell Global Product Marketing Manager for Fluorine Products, with a view from the refrigerant manufacturer's perspective on speeding up the adoption of lower GWP refrigerants.

Over the last two years the UK market has seen a massive acceleration in the development of new equipment designed for lower global warming potential (GWP) refrigerants. The industry recognises that the F-Gas Regulation can bring benefits across the refrigeration value chain.

The ultimate objective of the regulation is to reduce emissions of HFCs by 79 per cent between 2015 and 2030 with the HFC phase down as one of its main measures to reduce their consumption.

Firstly, producers like Honeywell developed next generation, lower GWP refrigerants. Then OEMs introduced products for supermarkets and stationary refrigeration designed to work with these lower GWP alternatives.

The availability of the equipment has enabled installers to respond to the demands of the F-Gas Regulation. Contractors and installers are a critical part of the puzzle in driving towards lower GWP refrigerants along with facility management services.

Different refrigerants exist for specific applications, some addressing a pressing need for retrofitting installed equipment with lower GWP solutions, some representing longer term solutions with an ultra low GWP.

The new refrigerant options, some of which can be mildly flammable A2Ls, require an upgrade of skillsets. Manufacturers, distributors and installers need to be able to handle A2L refrigerants. This upgrading is all the more urgent in view of further cuts in quota.

Alternatives to R404A

Supermarkets are a good example of how successful the switch to lower GWP refrigerants has been. Honeywell manufactures medium and long term alternatives to replace R404A, the high GWP refrigerant, which has been a popular choice in commercial refrigeration installations.

Solstice® N40 (R448A) is a replacement for R404A, that is suitable for retrofitting existing systems as well as for new installations. With a GWP of 1387 and a non-flammable classification, it offers a safe, lower GWP solution, which helps improve energy efficiency in low and medium temperature refrigeration packs.

Since 2018 the F-Gas Regulation has cut back supplies of high GWP refrigerants and the uptake of Solstice® N40 in the European market has grown considerably. For manufacturers adapting equipment to R448A is a quick and easy way to reduce GWP.

Solstice® L40X (R455A) represents a long term alternative to R404A for cooling cabinets in supermarkets and convenience stores. It is a versatile refrigerant with a GWP of less than 150.

Extensively tested in the industry and approved by several major compressor manufacturers, Solstice® L40X can be simply installed using a range of new refrigeration systems already qualified for use and serviced cost-effectively.

The safe, long term sustainability of Solstice® L40X and its ability to seamlessly replace legacy R404A systems underscores why it is likely to become a first-choice refrigerant.

Air conditioning applications

Looking at the air conditioning sector, manufacturers have accelerated their range of low GWP equipment. Significant achievements have been made with Solstice® ze (R1234ze) and Solstice® zd (R1233zd), both with a GWP of around 1.

Replacing the incumbent R134a, almost every equipment manufacturer has a full range of R1234ze offerings. With higher system efficiency versus R134a, this helps surpass the performance requirements of the EcoDesign and Energy Performance of Building Directives (EPBD).

In split systems there has been a movement towards the low GWP mildly-flammable R32 as a replacement for R410A. The VRF market will move to the non-flammable Solstice® N41 (R466A) solution from Honeywell which will address the A2L charge size limitation in compliance with EN378.

Chiller applications

Honeywell recently announced the launch of Solstice® N15 (R515B), A1 non-flammable and low GWP refrigerant replacement for R134a for use in chillers and heat pumps. With a GWP below 300, it can be used where safety standards and building codes limit the use of A2L refrigerants.

The new Danfoss Turbocor TGS490 compressor has been fully optimised for R1234ze and R515B refrigerants, which means customers can benefit from improved system efficiency while matching the cooling capacity of R134a thanks to lower pressure characteristics of this new compressor.

When looking for alternative refrigerants for R410A in chillers, we see that lower GWP A2L solutions are becoming popular in the short term. Manufacturers still need to address important questions on what comes beyond 2021, when the GWP threshold reduces. R1234ze can be a viable long term solution to achieve maximum efficiency and reduce the GWP further.

When evaluating the next solution it is critical to look at the whole lifecycle package and not just the cost of the refrigerant or the type of product. You also have to consider how it will work over the entire life of the product, what value it brings, and its energy efficiency which remains a key element.

We are working hard to help manufacturers and installers make the right choices.



R32 Leads the Way

Advice from Daikin on the benefits of new, compact and versatile air conditioning equipment which makes the most of this low-GWP refrigerant.

Over the last four years Daikin has been at the forefront of the industry transition towards R32 which has a GWP 68 per cent lower than the legacy refrigerant R410A.

It is now widely understood that R32 (GWP 675) is more environmentally friendly than R410A but perhaps what is less well known is how great an influence the use of R32 has had on the redesign of units which are now more compact and versatile.

Lower charge levels

The high efficiency of R32 refrigerant – which delivers a SEER (Seasonal Energy Efficiency Ratio) of up to 7.7 – is matched by greater volumetric efficiency. This means that R32 units contain up to 16 per cent less refrigerant charge and do not require yearly refrigerant containment checks which in turn reduces maintenance costs.

These characteristics of R32 have provided the opportunity for Daikin to redesign its units from the ground up over the last few years to fully take advantage of these greater efficiencies – an achievement which has been recognised in multiple awards. Innovations are continuing apace in 2020.

The Daikin Sky Air R32 range now offers the lowest gas charge per metre, compared with leading competitors. In the last few months Daikin UK has extended the Sky Air range to include low-height, single fan units delivering up to 25kW capacity.

The Sky Air Alpha series is now available in low height, single units up to 14kW. The single fan Sky Air Alpha series RZAG-N includes all

the features of the existing Sky Air Alpha such as EDP setting, 85m pipe length, replacement technology and leak check function – all within much smaller dimensions – making it ideal for communications' rooms.

Also added to the range are two new RZA-D units, which extend the Sky Air Advance Series up to 25kW and are capable of connecting up to four indoor units to a single outdoor unit.

Offering 20 and 25kW capacities, the RZA200D and RZA250D represent a major advance in technology, replacing the previous top blow unit with a compact single fan unit.

The new single fan unit offers lower height (870mm) for flexibility of installation on a wall or on the ground, while a maximum pipe length of up to 100m and a maximum height difference of 30m offers total installation flexibility.

Versatile and workable

Weighing just 117Kg, the new unit is easy to move with four ergonomically located lifting lugs, while the unique hinged door and seven-segment display makes it easier to handle and service too.

All these innovations mean that Daikin is continuing to lead the way in delivering the most efficient, versatile and workable solutions to ensure the industry takes full advantage of the benefits of R32, while helping to reduce the environmental impact of HVAC systems.



Bigger range,
smaller dimensions
Welcome to the future

Daikin UK now offers a low-height, single fan Sky Air range up to 25kW capacity, with an incredibly compact casing that minimises visibility in any location and can be wall mounted on a 600mm bracket.

The reduced height, weight and newly positioned handles make it easier to transport and install, while the unique hinged door and 7-segment display make it easier to handle and service too.

New Low Height Sky Air series up to 14kW

Available in 7.1, 10, 12.5 and 14kW capacity, the new low height Sky Air Alpha series RZAG-N delivers the highest Alpha specification and ECA eligibility, within much smaller dimensions. With a 40m pre-charged pipe-run and EDP settings, the new RZAG-N is ideal for communications rooms.



RZA-D extends Sky Air Advance Series to 25kW

Replacing the RZQ-C top blow units, the Sky Air Advance Series RZA-D unit now offers 20 and 25kW capacities in a compact new single fan casing.



**Get ahead of the competition.
Talk to Daikin about Sky Air today.**

SkyAir *A-series*
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Launching
Summer
2020



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Sustainable Cooling

*An overview from
refrigeration component manufacturer
Tecumseh on the switch to
mildly-flammable refrigerants.*

Tecumseh

For many years the refrigeration industry has played a key role in supporting food processing, storage and distribution. This has led to greater efficiencies in food production with refrigeration components and products becoming an essential part of the cold chain.

Air conditioning has also improved the comfort, health and safety of people around the world in domestic and commercial environments. Refrigerants have been at the heart of this, ensuring that the end user has the most effective and efficient refrigerant to use for each individual system.

Refrigerants have evolved as the world we live in has changed. Working together, government and industry have reacted professionally and responsibly to the challenges we face globally. CFC refrigerants were banned after their role in damaging the ozone layer was recognised.

Climate change is having a huge effect on how we live and work. Global warming is forcing us

to reduce the amount of virgin HFC refrigerants that we manufacture and use. In Europe, we have responded to this through the F-Gas Regulation which aims to curb our use of high GWP refrigerants.

Tecumseh manufactures and supplies hermetically-sealed compressors for commercial refrigeration, residential and speciality air conditioning. Tecumseh also supplies indoor and outdoor condensing units, coolers, heat pumps, complete refrigeration systems and authorised spare parts and accessories.

At Tecumseh we have met the climate change challenge fully by reviewing how we operate across the European Union market.

Tecumseh's commitment:

- We are fully committed to reducing carbon dioxide emissions and using low-GWP refrigerants by seeking innovative solutions through research and development.
- We are aiming for a sustainable and environmentally friendly solution and do not wish to contribute to the proliferation of refrigerants.
- In addition to our F-Gas commitment, all Tecumseh added-value products meet eco-design efficiency requirements and will be optimised for use with low-GWP refrigerants.
- We recognise that given the diversity of markets and applications, different options are needed to make it possible to evaluate the best appropriate alternatives.

No compromise with safety

For several years Tecumseh has been investing heavily in research and development, preparing for this transition by developing new equipment and working with new, low GWP alternatives.

Care is taken in selection and the key criteria applied are:

- Safety: flammability, pressure and toxicity.
- Reliability: temperature (operating window), compatibility and lubrication.
- Performance: volumetric capacity, energy efficiency and glide.
- Environment: GWP/TEWI, standards, approvals (federal, state and local laws).



R455A/
R454C

A2L alternatives

Equipment running on A2L alternatives to the currently most-used refrigerants is available from Tecumseh. R454C and R455A are a response to the use of R404A. R134a will be replaced by R1234yf. This makes it possible to offer our customers the best alternatives.

The use of these new refrigerants

From a contractor's perspective working with A2L alternatives is similar to working with HFC refrigerants but to comply with the F-Gas Regulation a risk analysis is important before work begins.



R1234yf

As with any other refrigerant, A2Ls should only be handled by a qualified refrigeration technician and the relevant safety criteria should apply to the volume of refrigerant and the equipment used for each job. A2L refrigerants are not suitable for retrofitting to existing installations.

There are also restrictions on transporting A2Ls, different charge calculations and new tools needed. For more information on this turn to Pages 24-25.

The partner of choice in the transition

Tecumseh will continue to evaluate sustainable alternatives and limit the proliferation of refrigerants on the EU market. Tecumseh believes that now is the time for engineers to start training to use new A2L refrigerants.

The company offers components compatible with redesigned and qualified sustainable refrigerant alternatives – including low-GWP synthetic refrigerants as well as naturals such as CO₂ or propane.

Changing from HFCs to HFOs

Making the switch can be relatively easy on commercial refrigeration systems ranging from 1Kw to 15Kw. A2Ls can be employed on direct expansion cooling systems and are fine alternatives for good technical and economic reasons.

SILENSYS® Advanced condensing units



The SILENSYS® range offers acoustically engineered, streamlined, fully featured and ready to install condensing units. They have exceptionally low noise levels, regardless of the installation conditions. The design means that they can be installed easily and be floor or wall mounted.

All accessories are supplied as standard. The main components can be accessed immediately, ensuring easy maintenance as well as ease of installation for additional control or command components.

The units are suitable for cold rooms, display cases, fermentation rooms, reach-ins, wine cellars and ice machines.

Features and benefits

The units offer a sustainable solution and run on low GWP refrigerants R455A, R454C and R1234yf. SILENSYS® Advanced condensing units address all requirements for stationary refrigeration systems. They are COP & SEPR compliant according to the Eco-design Directive for stationary refrigeration systems and condensing units.

The units are designed to the highest safety standards and should be installed by a qualified contractor. Their design helps prevent refrigerant leaks and the units are tested on an assembly line before being sold. They are appropriate for systems with cooling capacities ranging from 1Kw to 15Kw, are suitable for direct expansion systems and are simple to install.

Acoustics

The compressor compartment of SILENSYS® Advanced condensing units is insulated and the fan blades benefit from optimised geometry.

Compliance

SILENSYS® Advanced condensing units are designed to meet standard series EN378 of systems, ISO5149 and all the directives and applicable regulations. As with all jobs in refrigeration and air conditioning, it is the responsibility of the installer to conduct a risk analysis of the system in its environment before starting work.



Regulatory Bans

2020

New equipment ban on refrigerants with a **GWP greater than 2500** (exemption for equipment cooling products below -50°C).

Service ban using refrigerants with a **GWP greater than 2500** if the charge size is greater than 40T CO₂ equivalent* (approximately 10kgs of R404A).

Use of refrigerants with a **GWP above 150** banned in all new hermetically sealed moveable air conditioning equipment.

2022

Ban on the use of virgin refrigerants of **GWP greater than 150** in new hermetically sealed commercial refrigeration equipment.

The use of refrigerants with a **GWP above 150** will be banned in new commercial refrigeration systems with a capacity of 40kW or more.

N.B. The primary circuit of a cascade system can use a HFC with a GWP up to 1500.

2025

Ban on the use of virgin refrigerants of **GWP greater than 750** in the installation of single split air conditioning systems where the charge size is **less than 3kg**.

2030

Ban on the use of reclaimed refrigerants with a **GWP greater than 2500** to service equipment where the charge size is greater than 40T CO₂ equivalent (approximately 10kgs of R404A).

** Use of certified reclaim refrigerant allowable until 2030.*

Several refrigerants (not just R404A) have a GWP above 2500 and are affected by the New Equipment and Service Ban.

For products not listed please contact Wolseley or A-Gas for more information.

Please note: The F-Gas Regulations are subject to review in 2021/2022. Additional bans may come into force from 2023 onwards.

Product Use

Product	Ban
R404A (under 10kgs)	New Equipment Ban: 2020
R404A (over 10kgs)	New Equipment Ban: 2020 Service Ban: 2020*
Reclaimed R404A (under 10kgs)	New Equipment Ban: 2020
Reclaimed R404A (over 10kgs)	New Equipment Ban: 2020 Service Ban: 2030*
R407F (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R407A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R449A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R448A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R410A (in split A/C less than 3kgs)	New Equipment Ban: 2025
R452A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022

* Use of certified reclaim refrigerant allowable until 2030.

Several refrigerants (not just R404A) have a GWP above 2500 and are affected by the New Equipment and Service Ban.

For products not listed please contact Wolseley or A-Gas for more information.

**Please note: The F-Gas Regulations are subject to review in 2021/2022.
Additional bans may come into force from 2023 onwards.**

Where is Your Sector Going?

The A-Gas view on the product trends that are reshaping our industry.

AIR CONDITIONING



R410A

If your equipment contains 3kgs or more, R410A can still be used. If existing equipment is running ok, there is no need to change – continue to service this using virgin or reclaimed product*.

R32

New installations under 3kgs are likely to be on R32. This A2L has a low enough GWP to come under the current 750 threshold.

R466A

Large systems above 3kgs are likely to move to A1, low GWP alternatives such as R466A (Solstice N41) from Honeywell.

TRANSPORT

For larger systems, such as trains and ships, R404A can no longer be used.

R452A is an alternative option that is not currently affected by the F-Gas Regulation. However, with a high GWP of 2141 this may not be a long term solution*.

HEAT PUMPS



Gas boiler installations are to be outlawed in new homes by 2025. This will see the rise of heat pumps using:

R32 PROPANE R1234ZE

COMMERCIAL



Market shift to low GWP alternatives has been high, with use of:

R448A **R449A**

R513A **R452A**

RECLAIMED R404A

also remains a popular choice.

Be aware of the 150 GWP threshold in 2022 on new commercial multi-pack systems above 40kW.

For new installations the market may move to:

R454C **R454A**

R455A **R1234YF**

PROPANE **PROPYLENE**

CHILLERS

There is no current ban affecting the use of HFC refrigerants* in chillers. We expect to continue to see the use of:

R134a **R410A**

R32, **R454B** and **R513A** are alternatives being used in some applications.

Over time, users looking for longer term, low GWP solutions may move to:

R1234ZE **R1234YF**

INDUSTRIAL



As we move away from R404A and R507 in large industrial refrigeration systems, popular choices appear to be natural refrigerants such as:

AMMONIA **R744**

* Availability of HFCs with a high GWP may be affected following the quota phase down. Consider product availability when making your refrigerant choice.

A-Gas encourages you to always seek technical advice before making a product change.

N.B. The F-Gas Regulation is subject to review in 2021/2022 which may result in additional bans.

Reclaimed Refrigerant



A-Gas European Operations Director Rob Parker on the difference between recovered and recycled refrigerants and how both can be an excellent temporary, mid-term solution.

Refrigerant recovery is beginning to play a bigger role in our industry as the ban on the use of high GWP virgin refrigerants (above 2500) in new installations and servicing continues to make an impact.

This and other F-Gas step downs mean that over the years the amount of virgin, high GWP refrigerant available on the market will continue to decline.



A-Gas has invested heavily in expanding reclamation facilities as the industry rises to the low GWP challenge. We have built two new tanks at our site in Portbury near Bristol to increase our storage capacity for reclaimed refrigerants. A-Gas also has a base in Holland at Eyselshoven housing a new refrigerant reclamation facility.

In addition, A-Gas Rapid Recovery is a quick and easy way to recover refrigerant on site at short notice.

Customers have told us that they like the way it saves time on site and reduces costs while helping to maintain business as usual for the end user.

With recycling and reclamation on everyone's mind, we are often asked at A-Gas: "What is the difference between recycled and reclaimed product?" You can be reassured that using either in a system is allowed – within reason – but they are not the same.

Recycled refrigerant

A refrigerant that has been recycled is an uncertified product that is being returned for use on the same site and has not been moved between premises. It's a used refrigerant that has gone through a basic, on site cleaning process, normally carried out by the contractor completing the work.

Unprocessed refrigerant recovered from a system cannot be stored on site for longer than a year due to landfill issues. As soon as you move it from the site – unprocessed or recycled – it is classed as hazardous waste and must be sent, with the appropriate legal environmental paperwork, to a licensed facility for reprocessing or disposal.

Reclaimed refrigerant

A-Gas are reclaimed refrigerant specialists and don't sell recycled gas at all. Reclaimed refrigerant is a gas that has been reprocessed by a licensed facility to the industry standard AHRI 700 to match that of virgin product. It is refrigerant that is purified, certificated and guaranteed.

At our reclamation plants, used refrigerant undergoes chemical analysis, is cleaned of contaminants and goes through our separation plant to produce a product that matches that of virgin refrigerant requirements.

Refrigerant analysis service

Installers should act on the side of caution when looking to re-use recycled products that are not single component refrigerants.

You should be aware that a product can change composition through its life if the system has experienced leaks. This is particularly true for blends of refrigerants, such as the R407 family.

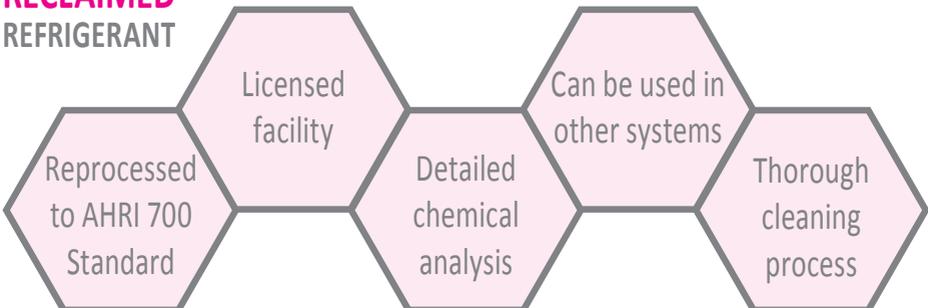
A-Gas offers a refrigerant analysis service at its custom-built lab in Portbury where it can confirm a refrigerant's composition and purity – and in doing so, help relieve that uncertainty.

Working together

Our investment in reclamation facilities highlights the commitment we have to providing the industry with the capacity and infrastructure to support the F-Gas phase downs.

Using certified reclaimed product is a way the engineer can help the industry and the customer in reducing the short-term impact of the F-Gas phase downs – bridging the gap to that time when a decision is needed on choosing a new generation refrigerant or natural alternative.

RECLAIMED REFRIGERANT



R32 and Beyond



A-Gas Managing Director John Ormerod with a guide to working safely with this mildly flammable and other A2L refrigerants.

A2Ls, or mildly flammables, are beginning to make a real impact on the refrigeration and air conditioning industry.

It's no secret that R32 has been championed as an A2L alternative for use in air conditioning split systems. R32 is widely available on the market in a variety of cylinder sizes and from a practical perspective is a good replacement for R410A – a high GWP gas which, like other high GWP products, is under pressure as the quota system takes effect.

Manufacturers already supply equipment which is R32 ready and the message is reaching engineers and end users that this single component gas with a GWP of 675 is a winner – especially when you consider that the commonly used R410A has a GWP of more than 2000.

We have seen over the years that there is no guarantee that any refrigerant is future proof but it is a good bet that R32 will be a preferred option in air conditioning systems for many years to come.

The sooner the industry gets used to using R32 the better positioned it will be to adopt A2Ls when they become mainstream throughout refrigeration.

Excellent alternatives

The availability of virgin HFC refrigerants is something to keep an eye on over the coming years. The quota phase down will continue to have an impact on our industry's supply chain and users are encouraged to move to refrigerants with a low GWP, many of which are mildly flammable.

At A-Gas we believe that the popularity of these mildly flammable refrigerants will grow as the F-Gas phase downs continue. The fact that R32 has already become a preferred choice in air conditioning split systems has shown that A2Ls can be a success and the industry is ready to adopt change.

In addition to the lower GWP when compared to traditional HFCs such as R404A, A2Ls are excellent alternatives due to the lower charge sizes, smaller line sizes and potential cut in running costs.

It is clear to see that A2Ls are workable alternatives on the road to a kinder, more environmentally-friendly future for our industry.

Advances with tools

A2Ls require a different approach and engineers need to be more aware of how to handle them, while also ensuring that they have the right tools to do so.

Users must not retrofit a system operating on a non-flammable refrigerant to an A2L – these mildly flammable products must only be used with new, purpose-built equipment.

Manifolds and hoses are already on the market and enable engineers to do the job safely.

Whatever the task, make sure that you only use approved equipment. If in doubt, always ask. The Safe Seal Charging Hoses, from JAVAC, are a good option for those looking for suitable equipment – see Page 28 for more information.

Recovery

Refrigerant recovery machines and suitable recovery cylinders can only be used which are specifically designed to handle mildly flammable refrigerants.

The good news is that such units and cylinders are available off the shelf to tackle these jobs.

It is not recommended to mix A2L refrigerants with other types of gases in recovery cylinders.

Do not exceed the stated safe weight for the cylinder when recovering the gas – the figure is stenciled on the cylinder – and make sure you complete all the F-Gas records.

Product cylinders

The cylinders containing A2L refrigerants, such as R32, are easily recognisable by the red shoulder, labelling and valve connection.

All A2L cylinder valves have a left-hand thread, whereas standard HFCs have a right-hand thread.



Charge calculations

Mildly flammable refrigerants bring some complexity by introducing the need to do charge limit calculations. You will need to refer to BS EN 378:2016 for the full calculation methodology.

There are several mitigating factors to consider with A2Ls which will include location of equipment, leak detection and ventilation.

Many manufacturers of equipment provide specific guidance. Seek clarity if you are unsure.

Flammables on the road

Transporting A2Ls requires new ways of thinking.

Like all refrigerants, care should be taken when they are moved but also bear in mind that A2Ls are not recognised as a separate classification by the ADR Regulations and the guidance on transporting flammable refrigerants applies.

Vehicles should be ventilated and there should be a fire extinguisher on hand. The appropriate vehicle marking and documentation is also needed.

Training

Training and qualifications are essential. Make sure you and your engineers attend suitable training courses focused on the safe use of A2L refrigerants. See Page 32 for more information on training.

Great future ahead

A2L refrigerants are the next step in refrigeration technology and are instrumental in our industry meeting the phase downs.

With their greater energy efficiency, smaller charge sizes and reduced equipment footprints they have a lot to offer the refrigeration engineer and the end user.

Versatile options: R455A and R454C

R404A, the legacy gas for refrigeration systems, has a GWP as high as 3922. By using an A2L refrigerant you can reduce this significantly.

R455A (Solstice® L40X) and R454C (Opteon™ XL20) both have a GWP of less than 150 and are excellent alternatives to R404A in commercial refrigeration equipment.

If you are still unsure and want further advice, contact your refrigeration suppliers. We are on hand to support you.



A2L Best Practice Guide



- ✔ **Handle A2L Refrigerants appropriately** – ensure you have a well-ventilated work area, which is free of sources of ignition and use appropriate leak detection
- ✔ **Training and Qualifications are essential** – attend suitable training courses for the safe use of A2L Refrigerants
- ✔ Use **additional safety measures where possible**, such as forced ventilation, automatic valve shut-off and pressure switch regimes
- ✔ **DO NOT retrofit to an A2L** – these mildly flammable products must only be used with new, purpose-built equipment
- ✔ **Consult the Safety Data Sheet** and take necessary safety measures
- ✔ Ensure compliance with **Refrigeration Standard EN378**
- ✔ Use the correct **tools and equipment**
- ✔ **Seek further advice** where required
- ✔ Follow the **manufacturer's installation and operating instructions**

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Safe and Secure



Scott Davies, UK Sales Director for JAVAC UK, explains why their unique Safe Seal charging hoses are the safest way to attach refrigerant hoses to a service port.

When engineers are servicing refrigeration systems there is the potential for refrigerant to spray out from the service port. This can result in refrigerant loss and the risk of refrigerant burn for the engineer. Designed with the user in mind, JAVAC's safe seal charging hoses are the only hoses on the market that feature a special valve that eliminates this risk.

Secure fitting

The ideal addition to an engineer's toolkit, the R32 ready hoses' One-Touch design ensures user safety by securing the fitting connection before starting refrigerant flow.

Engineers simply turn the single knob to tighten the fitting onto the service port. After the valve is fully connected, turning the knob pushes the internal core depressor to activate refrigerant flow from the system. Only once fully secured and sealed can the refrigerant run from the system into the hose. Crucially, thanks to the One-Touch design, refrigerant cannot spray out when connecting the hose to the system.

Safety is improved further with the swivel design. The innovative swivel sleeve ensures that the fitting will not come loose – even if the hose is moved or accidentally tugged on. It also allows free rotational movement, without the fitting becoming loose.

Traditionally hoses without a sleeve, run the risk that a fitting connection will loosen when a hose is moved, resulting in unwanted leaks.

Hose disconnection is just as safe and easy as connection. Turning the knob backseats the core depressor – closing the Schrader valve and stopping the flow of refrigerant. The fitting is then unscrewed from the port by continuing to turn the same knob.

Stopping the flow of refrigerant while the fitting is still securely connected ensures no loss of gas. Once the fitting is safely disconnected, refrigerant inside the hose will remain safely sealed inside, unable to escape to air and can be recovered at a later time.

Quality and efficiency

With years of engineering and servicing experience JAVAC endeavours to deliver the best and most complete range of tools in the industry. JAVAC's safe seal charging hoses make the engineers' job easier and safer while minimising the environmental impact of refrigerant gas.

Innovative, high quality and efficient to use, the hoses are simple to transport and use, while offering JAVAC's market-leading performance.





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hassle-free tools that
make a difference to your
working day – think JAVAC.

Safe Seal charging hoses



JAVAC is the UK's No.1 HVAC/R tool specialist and part of the ASPEN PUMPS GROUP

JM0140 DEC 2019



Registration and Certification



Graeme Fox, Senior Mechanical Engineer at the Building Engineering Services Association, on why registration and certification is a must for all installers in the refrigeration, air conditioning and heat pump industries.

It is all too easy to miss what we've achieved in the refrigeration, air conditioning and heat pump industries in recent years when it has happened slowly and when so much still needs to be done.

But if you take a step back and look at how our industry has changed the achievements are plain to see.

When the original F-Gas Regulation came into force in July 2007 the refrigeration, air conditioning and heat pump sectors had a terrible reputation for poor leak control standards.

Working practices

With an emphasis on improving containment the regulation was successful in focusing the industry's attention on better working practices. In recent years this focus has moved from containment towards changing the landscape within which we operate.

The reference points went from physical charge in terms of kilogrammes to focussing on the Global Warming Potential (GWP) of refrigerants by referencing everything in terms of CO₂ equivalent.

Simultaneously, the regulation has forced a phase down of refrigerants in use by implementing a quota mechanism that reduces sharply over a 15-year period from 2015 to 2030. This has shifted the market direction significantly in a number of ways:

- Equipment manufacturers have developed systems working with different blends and compounds.
- There has been a focus on reclamation and recycling to encourage the use of refrigerants already in the market rather than new virgin products.
- The need for upskilling a contractor base that now frequently works with flammable substances that they were not originally trained to handle has also emerged.

The F-Gas Regulation has been transposed into UK law and is now part of the British legal system. The certification and personnel competence requirements have all been set at the UK level.

F-Gas company certificate

All businesses that install, maintain or service stationary equipment containing or designed to contain F-Gas refrigerants have to have an F-Gas company certificate.

As a result, F-Gas certification bodies such as REFCOM, the Register of Companies Competent to Manage Refrigerants, have grown in importance and have a key role to play within our industry.

Setting standards is key. BESA, the Building Engineering Services Association, from which REFCOM was originally formed, now contains specialist groups to help shape our industry. These range from promoting and improving professionalism, to maintaining the highest technical standards that safeguard our environment.

Improving compliance

As the next step in raising standards, improving compliance should be on everyone's radar, not just that of BESA. In an attempt to achieve this, REFCOM has designed an elite scheme that focuses on enabling manufacturers, wholesalers and distributors of equipment and refrigerants to sign up to a voluntary code of conduct.

The code is designed to ensure that sellers of refrigerants and pre-charged equipment understand the rules of who they can, and perhaps more importantly, cannot sell to.

The code also states that they operate to the spirit of the regulation – not just the actual wording. If you haven't already, I recommend becoming a member of this scheme.

The regulatory landscape we now work in has professionalised our sector at a rate previously thought to be impossible. Registration, certification and compliance now play an integral part in enabling people to work competently in our skilled industry.

Make sure you comply!

For more information



thebesa.com



refcom.org.uk

Train to Gain!

Mike Creamer, Institute of Refrigeration President-elect and Business Edge Managing Director, on why training has a key role to play in meeting the demands of the F-Gas Regulations.



BUSINESSEGE
AIR CONDITIONING & REFRIGERATION SPECIALISTS

Such has been the pace of change with the F-Gas Regulations in the past five years that it is easy for installers to forget that they are legally required to keep up with all these new developments in the workplace.

Under F-Gas, anyone working with equipment containing refrigerant must hold LCL Awards, City & Guilds 2079 or BESA (Category I-IV) Certification.

I understand how difficult it can be when you are busy on the tools to find time for training but if you don't have the right certification to do the job, you are putting people's lives at risk and could face a hefty fine.

With new generation refrigerants already with us there's no time to waste to ensure that you are up to speed with what's new refrigerants' wise.

A2Ls have emerged as ready-made alternatives to high GWP refrigerants. The success of the A2L R32 in split-system air conditioning is evidence that lower-flammables are here to stay.

But there's no need to be fazed about working with A2Ls. You can learn about new charge calculations, changes in handling, transportation, ventilation and unfamiliar tools quickly and easily.

*Training is good
for your business.
With the right certification
it opens up new streams of
revenue by highlighting your
competency to customers.*

Your reputation is key to the success of your business and training has a vital role in maintaining this.

More change is on the way with the F-Gas Regulations in the years to come and this will have a significant effect on our workplace.

But if you're not sure about what to do when working with A2Ls or any other new generation refrigerants, don't panic – help is on hand.

Authorised training providers have the expertise to help you rise to the high-GWP challenge in a way that will suit you and your business.

Jargon Buster

Wolseley and A-Gas often answer questions from engineers about the terminology relating to our industry. Our experts have put together a brief guide for you to refer to on the go.

F-Gas

F stands for fluorinated. F-Gas is the term used to describe a particular family of fluorinated gases widely used as refrigerants.

GWP

The GWP or Global Warming Potential of a refrigerant is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It allows for the comparison of the global warming impact of different gases. CO₂, by definition, has a GWP of one regardless of the time period used and is the gas used as the reference. See Page 35 for a GWP summary list.

CO₂ equivalent

This is a measure for describing how much global warming potential a greenhouse gas may cause using the functionally equivalent amount or concentration of carbon dioxide (CO₂) as the reference.

Quota

A quota system has been introduced to control refrigerant sales in the EU and UK market. This will affect all HFC producers, importers and exporters and is based on control of bulk HFC production, import and export. There are additional controls for the import of pre-charged products.

Phase down

The F-Gas Regulation was implemented on Jan 1 2015. The regulation puts in place an HFC phase down from 2015 to 2030 by means of a quota system and bans on high GWP refrigerants in Europe.

HFC

Hydrofluorocarbons are a refrigerant class made up of carbon, fluorine and hydrogen. These contain the higher GWP refrigerants phased out under the F-Gas Regulation and include products such as R404A.

HFO

HFOs or hydrofluoro-olefins are an unsaturated compound of hydrogen, fluorine and carbon. HFCs and CFCs are saturated. HFO refrigerants have a much lessened GWP than HFC alternatives but there is concern that HFO refrigerants have a much higher flammability rate than HFCs. HFOs include products such as R1234YF.

Retrofit

Removing a refrigerant from a system and replacing it with another compatible product that offers the required performance.

Recovery cylinder

Cylinders used to return recovered refrigerant that the customer no longer requires. They have a yellow valve guard and a dual port valve to enable push-pull recovery of gas. They may contain traces of oil and other contaminants and are not suitable for A2L refrigerants or Ammonia.

Receiver cylinder

Cylinders used as a temporary storage vessel for refrigerant that the engineer wishes to re-introduce into a system. These cylinders with a yellow and black banded valve guard and dual port valves enable push-pull recovery of gas. They should be returned to A-Gas empty. They are not suitable for A2L refrigerants or Ammonia.

Reclaim

Recovered refrigerant material sent to a licensed facility such as A-Gas to undergo a thorough cleaning process that is reprocessed to the same standard as AHRI 700 material.

Recycle

This is where recovered material has undergone a basic cleaning process for re-use on the same site. Be aware that moving recycled refrigerants between sites is prohibited due to waste transfer restrictions.

Global Warming Potential

R744 (CO ₂) GWP 1	R1270 (Propylene) GWP 2	R290 (Propane) GWP 3	R600A (Iso-butane) GWP 4
HFO1234YF GWP 4	Opteon™ XL10 (R1234YF) GWP 4	HFO1233ZD REF GWP 5	HFO1234ZE GWP 7
Opteon™ XL20 (R454C) GWP 148	Solstice® L40X (R455A) GWP 148	Opteon™ XL40 (R454A) GWP 238	R515B GWP 293
Solstice® L20 (R444B) GWP 296	Opteon™ XL41 (R454B) GWP 466	Solstice® N13 (R450A) GWP 604	Opteon™ XP10 (R513A) GWP 631
R32 GWP 675	Solstice® L41Y (R452B) GWP 698	Opteon™ XL55 (R452B) GWP 698	Solstice® N41 (R466A) GWP 733
Solstice® N40 (R448A) GWP 1387	Opteon™ XL40 (R449A) GWP 1397	R134a GWP 1430	RS-70 (R453A) GWP 1765
R407C GWP 1774	Isceon MO49 Plus (R437A) GWP 1805	R407F (Performax LT) GWP 1825	R410A GWP 2088
R407A GWP 2107	Opteon™ XP44 (R452A) GWP 2140	Isceon MO59 (R417A) GWP 2346	Isceon MO29 (R422D) GWP 2729
RS-52 (R428A) GWP 2999	Isceon MO79 (R422A) GWP 3143	R404A/ Reclaimed R404A GWP 3922	R507/ Reclaimed R507 GWP 3985

(GWP values based on Assessment Report 4)



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The RAC Engineer's Guide to Low GWP Refrigerants

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Finding your way to the right solution



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Contents

04 Introduction from Wolseley's Robert Franklin

08 Mark Hughes of Chemours on A2Ls



10 The Manufacturer's View from Honeywell

12 Daikin on New Air Conditioning Equipment

15 Tecumseh on Sustainable Cooling

18 Regulatory Bans

19 Product Use

20 Where is Your Sector Going?

22 Rob Parker of A-Gas on Reclamation

24 John Ormerod of A-Gas on Working with A2Ls

28 JAVAC's Scott Davies on Safe and Secure Charging Hoses



30 Graeme Fox on Registration

32 Mike Creamer on Training

33 F-Gas Jargon-Buster

35 GWP Summary Table



Years of Great Change



Wolseley Sales Director for Cooling Robert Franklin says help is on hand for installers on how to deal with the latest developments in the F-Gas Regulation.

Change can be unrelenting in the refrigeration industry. We've passed through three years of uncertainty about refrigerant availability, unpredictable pricing and the introduction of new generation gases that are now considered mainstream refrigerants.

Our industry should be praised for its achievements in meeting the low-GWP challenge set out by the F-Gas Regulation.

There's been a huge reduction in the amount of high GWP refrigerant being used and innovation across our supply chain has ensured that the impact of the quota step downs have been cushioned for our customers.

As the step downs continue alternative refrigerants will have a greater role to play. Adopting the benefits of alternative gases like A2Ls will give the industry breathing space to handle what's coming down the road.

The road ahead

The F-Gas Regulation stepped up a gear this year with the hard stop on installing R404A and other high Global Warming Potential (GWP) gases. If you

roll forward into 2021 and 2022 greater change is on the way. In 2021 there's the next stepdown in the F-Gas quota when virgin refrigerant availability will drop by another 29 per cent, on a CO₂ equivalent basis, taking the industry down to 45 per cent of the 2015 baseline level.

In 2022 the bar for the use of virgin HFCs is raised even higher when the threshold drops from 2500 to 150 GWP for hermetically sealed equipment and multipack centralised refrigeration equipment above 40kW. This will really ramp up the pressure on the industry.

This year saw the major refrigerant suppliers saying goodbye to virgin R404A. The good news is that reclaimed R404A can be used up until 2030, regardless of the charge size, and this is now a standard stock item within our branch network.

It is not all doom and gloom for our industry. If users continue to move to the next generation refrigerants our market can still continue to grow. New blends are emerging and with a GWP as low as 4 they appear to be viable alternatives to R404A.



As the industry moves towards using alternative refrigerants a different approach and new ways of working need to be adopted by the contractor.

As a leading distributor of refrigeration and air conditioning products, Wolseley are here to help you navigate the F-Gas maze and make switching refrigerants simple.



Wolseley are here to help you navigate the F-Gas maze and make switching refrigerants simple.

Here to help

Our F-Gas guide has been designed to help you understand the changes, what options are available and how they can be implemented safely.

Please use our guide to aid your decisions, demonstrate your thinking and to help your customers understand the difficulties facing our industry.

We know that climate change is a long-term challenge for our industry to tackle and this is one area that will help to significantly reduce the cooling industry's carbon emissions.

If I could only offer one piece of advice – it would be to look at all the options now and seek expert advice if you are unsure. It is not a time to ignore what's to come and the Wolseley team are here to help.





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-  On-Site Refrigerant Recovery

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A2L Refrigerants



Mark Hughes, Business Development Manager for refrigerants' manufacturer Chemours, on how A2L refrigerants are already making their mark with the major supermarkets.

The major supermarket chains have shown that the new frontier refrigerants mildly-flammable A2Ls, can play a key role in meeting the demands of the F-Gas Regulations.

While some sectors of the refrigeration industry have been slow to respond, the supermarkets have realised that meeting the high GWP challenge is a priority.

Trials and independent studies have taken place which have revealed excellent results in using the A2Ls in large and small store operations.

The supermarkets understand that making the switch to low GWP refrigerants is good for business, as customers demand that their goods and services be produced and delivered in more environmentally-friendly and less wasteful ways.

Store installations

In a trial involving A2Ls and ASDA at a Shell store in Leeds the results were impressive. The system ran on Chemours' Opteon XL40 (R454A) with a GWP of 238. With XL40 the GWP dropped by 94 per cent when compared with using R404A (GWP 3922). The cooling performance was maintained and there was improved energy efficiency.

The results were put to good use in the first live installation of XL40 in a new ASDA store at

Trafford Park, Manchester. In a first for the Co-op, another trial took place at a new convenience store in Derby. This featured an A2L-ready pack running on Opteon XL20 (R454C) with a GWP of 148. The supermarket was looking for the lowest possible GWP alternative to using R404A. Again the A2L did not disappoint and the trial was a success.

Independent study

An independent study on A2Ls involving Wave Refrigeration was also commissioned by Chemours. This revealed that Opteon XL20 and Opteon XL40 could be superb alternatives to high GWP refrigerants in different climates. Comparisons were made on typical supermarket installations in several climates including the moderate temperatures of Leicester and the hot conditions of Seville, Spain. In both cases the results were impressive.

Running costs were lower, there was significantly less impact on the climate and energy costs were also reduced. The study highlighted the fact that Opteon XL refrigerants clearly offered a viable alternative to high GWP gases or natural refrigerant options.

BRA guide to A2Ls

The information gathered through the results of the store trials will be available to contractors in a guide produced by the British Refrigeration Association. This will help engineers with the installation of A2Ls and set out in detail the risk assessment necessary when working with mildly flammables.

Energy efficiency

The Opteon products have been designed to be energy efficient and the trials have shown that they can have a better performance than systems running on hydrocarbons or CO₂. This is because we have blended our products to have the optimum balance of low GWP and energy efficiency. The advantage we have is that we can design products to offer the best performance in a commercial refrigeration situation.

The environment

Opteon XL20 has a GWP of less than 150, while Opteon XL40 has a GWP of less than 240. So, the effects of leaks on the environment are lessened considerably.

The future

Once engineers have an understanding of how to work with A2Ls, I am sure they will become the refrigerant of choice. The systems are cheaper to run and maintain and are here for the long run. The success of R32 in air conditioning systems has shown that A2Ls are very much here to stay and I am sure that will be the case in commercial refrigeration, especially in the areas of store refits, convenience stores and petrol forecourt operations.

In smaller installations A2Ls offer a much cheaper and more effective alternative to CO₂ systems or other natural refrigerants and this is where they can really make an impact from an installer's point of view.

**R454C
(XL20)
<150**

**R454A
(XL40)
<240**



Moving Forward



Tunca Sekban, Honeywell Global Product Marketing Manager for Fluorine Products, with a view from the refrigerant manufacturer's perspective on speeding up the adoption of lower GWP refrigerants.

Over the last two years the UK market has seen a massive acceleration in the development of new equipment designed for lower global warming potential (GWP) refrigerants. The industry recognises that the F-Gas Regulation can bring benefits across the refrigeration value chain.

The ultimate objective of the regulation is to reduce emissions of HFCs by 79 per cent between 2015 and 2030 with the HFC phase down as one of its main measures to reduce their consumption.

Firstly, producers like Honeywell developed next generation, lower GWP refrigerants. Then OEMs introduced products for supermarkets and stationary refrigeration designed to work with these lower GWP alternatives.

The availability of the equipment has enabled installers to respond to the demands of the F-Gas Regulation. Contractors and installers are a critical part of the puzzle in driving towards lower GWP refrigerants along with facility management services.

Different refrigerants exist for specific applications, some addressing a pressing need for retrofitting installed equipment with lower GWP solutions, some representing longer term solutions with an ultra low GWP.

The new refrigerant options, some of which can be mildly flammable A2Ls, require an upgrade of skillsets. Manufacturers, distributors and installers need to be able to handle A2L refrigerants. This upgrading is all the more urgent in view of further cuts in quota.

Alternatives to R404A

Supermarkets are a good example of how successful the switch to lower GWP refrigerants has been. Honeywell manufactures medium and long term alternatives to replace R404A, the high GWP refrigerant, which has been a popular choice in commercial refrigeration installations.

Solstice® N40 (R448A) is a replacement for R404A, that is suitable for retrofitting existing systems as well as for new installations. With a GWP of 1387 and a non-flammable classification, it offers a safe, lower GWP solution, which helps improve energy efficiency in low and medium temperature refrigeration packs.

Since 2018 the F-Gas Regulation has cut back supplies of high GWP refrigerants and the uptake of Solstice® N40 in the European market has grown considerably. For manufacturers adapting equipment to R448A is a quick and easy way to reduce GWP.

Solstice® L40X (R455A) represents a long term alternative to R404A for cooling cabinets in supermarkets and convenience stores. It is a versatile refrigerant with a GWP of less than 150.

Extensively tested in the industry and approved by several major compressor manufacturers, Solstice® L40X can be simply installed using a range of new refrigeration systems already qualified for use and serviced cost-effectively.

The safe, long term sustainability of Solstice® L40X and its ability to seamlessly replace legacy R404A systems underscores why it is likely to become a first-choice refrigerant.

Air conditioning applications

Looking at the air conditioning sector, manufacturers have accelerated their range of low GWP equipment. Significant achievements have been made with Solstice® ze (R1234ze) and Solstice® zd (R1233zd), both with a GWP of around 1.

Replacing the incumbent R134a, almost every equipment manufacturer has a full range of R1234ze offerings. With higher system efficiency versus R134a, this helps surpass the performance requirements of the EcoDesign and Energy Performance of Building Directives (EPBD).

In split systems there has been a movement towards the low GWP mildly-flammable R32 as a replacement for R410A. The VRF market will move to the non-flammable Solstice® N41 (R466A) solution from Honeywell which will address the A2L charge size limitation in compliance with EN378.

Chiller applications

Honeywell recently announced the launch of Solstice® N15 (R515B), A1 non-flammable and low GWP refrigerant replacement for R134a for use in chillers and heat pumps. With a GWP below 300, it can be used where safety standards and building codes limit the use of A2L refrigerants.

The new Danfoss Turbocor TGS490 compressor has been fully optimised for R1234ze and R515B refrigerants, which means customers can benefit from improved system efficiency while matching the cooling capacity of R134a thanks to lower pressure characteristics of this new compressor.

When looking for alternative refrigerants for R410A in chillers, we see that lower GWP A2L solutions are becoming popular in the short term. Manufacturers still need to address important questions on what comes beyond 2021, when the GWP threshold reduces. R1234ze can be a viable long term solution to achieve maximum efficiency and reduce the GWP further.

When evaluating the next solution it is critical to look at the whole lifecycle package and not just the cost of the refrigerant or the type of product. You also have to consider how it will work over the entire life of the product, what value it brings, and its energy efficiency which remains a key element.

We are working hard to help manufacturers and installers make the right choices.



R32 Leads the Way

Advice from Daikin on the benefits of new, compact and versatile air conditioning equipment which makes the most of this low-GWP refrigerant.

Over the last four years Daikin has been at the forefront of the industry transition towards R32 which has a GWP 68 per cent lower than the legacy refrigerant R410A.

It is now widely understood that R32 (GWP 675) is more environmentally friendly than R410A but perhaps what is less well known is how great an influence the use of R32 has had on the redesign of units which are now more compact and versatile.

Lower charge levels

The high efficiency of R32 refrigerant – which delivers a SEER (Seasonal Energy Efficiency Ratio) of up to 7.7 – is matched by greater volumetric efficiency. This means that R32 units contain up to 16 per cent less refrigerant charge and do not require yearly refrigerant containment checks which in turn reduces maintenance costs.

These characteristics of R32 have provided the opportunity for Daikin to redesign its units from the ground up over the last few years to fully take advantage of these greater efficiencies – an achievement which has been recognised in multiple awards. Innovations are continuing apace in 2020.

The Daikin Sky Air R32 range now offers the lowest gas charge per metre, compared with leading competitors. In the last few months Daikin UK has extended the Sky Air range to include low-height, single fan units delivering up to 25kW capacity.

The Sky Air Alpha series is now available in low height, single units up to 14kW. The single fan Sky Air Alpha series RZAG-N includes all

the features of the existing Sky Air Alpha such as EDP setting, 85m pipe length, replacement technology and leak check function – all within much smaller dimensions – making it ideal for communications' rooms.

Also added to the range are two new RZA-D units, which extend the Sky Air Advance Series up to 25kW and are capable of connecting up to four indoor units to a single outdoor unit.

Offering 20 and 25kW capacities, the RZA200D and RZA250D represent a major advance in technology, replacing the previous top blow unit with a compact single fan unit.

The new single fan unit offers lower height (870mm) for flexibility of installation on a wall or on the ground, while a maximum pipe length of up to 100m and a maximum height difference of 30m offers total installation flexibility.

Versatile and workable

Weighing just 117Kg, the new unit is easy to move with four ergonomically located lifting lugs, while the unique hinged door and seven-segment display makes it easier to handle and service too.

All these innovations mean that Daikin is continuing to lead the way in delivering the most efficient, versatile and workable solutions to ensure the industry takes full advantage of the benefits of R32, while helping to reduce the environmental impact of HVAC systems.



Bigger range,
smaller dimensions
Welcome to the future

Daikin UK now offers a low-height, single fan Sky Air range up to 25kW capacity, with an incredibly compact casing that minimises visibility in any location and can be wall mounted on a 600mm bracket.

The reduced height, weight and newly positioned handles make it easier to transport and install, while the unique hinged door and 7-segment display make it easier to handle and service too.

New Low Height Sky Air series up to 14kW

Available in 7.1, 10, 12.5 and 14kW capacity, the new low height Sky Air Alpha series RZAG-N delivers the highest Alpha specification and ECA eligibility, within much smaller dimensions. With a 40m pre-charged pipe-run and EDP settings, the new RZAG-N is ideal for communications rooms.



RZA-D extends Sky Air Advance Series to 25kW

Replacing the RZQ-C top blow units, the Sky Air Advance Series RZA-D unit now offers 20 and 25kW capacities in a compact new single fan casing.



**Get ahead of the competition.
Talk to Daikin about Sky Air today.**

Cylinder Management App

It's Free

Download the brand new Wolseley Climate Cylinder Management app; **free and exclusive to Wolseley customers.**

The app has been designed for HVACR distributors and contractors, and provides easy solutions for cylinder tracking, reporting and stock management.

With the app you can:

- » Eliminate your rental costs
- » Manage your cylinder fleet
- » Access your database
- » Auto feed data on sales and returns for Wolseley cylinders
- » Manage your F-Gas compliant reporting

To find out more, go to wolseley.co.uk/cylinder-management

Launching
Summer
2020



WOLSELEY



The Specialist Merchant



Sustainable Cooling

*An overview from
refrigeration component manufacturer
Tecumseh on the switch to
mildly-flammable refrigerants.*

Tecumseh

For many years the refrigeration industry has played a key role in supporting food processing, storage and distribution. This has led to greater efficiencies in food production with refrigeration components and products becoming an essential part of the cold chain.

Air conditioning has also improved the comfort, health and safety of people around the world in domestic and commercial environments. Refrigerants have been at the heart of this, ensuring that the end user has the most effective and efficient refrigerant to use for each individual system.

Refrigerants have evolved as the world we live in has changed. Working together, government and industry have reacted professionally and responsibly to the challenges we face globally. CFC refrigerants were banned after their role in damaging the ozone layer was recognised.

Climate change is having a huge effect on how we live and work. Global warming is forcing us

to reduce the amount of virgin HFC refrigerants that we manufacture and use. In Europe, we have responded to this through the F-Gas Regulation which aims to curb our use of high GWP refrigerants.

Tecumseh manufactures and supplies hermetically-sealed compressors for commercial refrigeration, residential and speciality air conditioning. Tecumseh also supplies indoor and outdoor condensing units, coolers, heat pumps, complete refrigeration systems and authorised spare parts and accessories.

At Tecumseh we have met the climate change challenge fully by reviewing how we operate across the European Union market.

Tecumseh's commitment:

- We are fully committed to reducing carbon dioxide emissions and using low-GWP refrigerants by seeking innovative solutions through research and development.
- We are aiming for a sustainable and environmentally friendly solution and do not wish to contribute to the proliferation of refrigerants.
- In addition to our F-Gas commitment, all Tecumseh added-value products meet eco-design efficiency requirements and will be optimised for use with low-GWP refrigerants.
- We recognise that given the diversity of markets and applications, different options are needed to make it possible to evaluate the best appropriate alternatives.

No compromise with safety

For several years Tecumseh has been investing heavily in research and development, preparing for this transition by developing new equipment and working with new, low GWP alternatives.

Care is taken in selection and the key criteria applied are:

- Safety: flammability, pressure and toxicity.
- Reliability: temperature (operating window), compatibility and lubrication.
- Performance: volumetric capacity, energy efficiency and glide.
- Environment: GWP/TEWI, standards, approvals (federal, state and local laws).



R455A/
R454C

A2L alternatives

Equipment running on A2L alternatives to the currently most-used refrigerants is available from Tecumseh. R454C and R455A are a response to the use of R404A. R134a will be replaced by R1234yf. This makes it possible to offer our customers the best alternatives.

The use of these new refrigerants

From a contractor's perspective working with A2L alternatives is similar to working with HFC refrigerants but to comply with the F-Gas Regulation a risk analysis is important before work begins.



R1234yf

As with any other refrigerant, A2Ls should only be handled by a qualified refrigeration technician and the relevant safety criteria should apply to the volume of refrigerant and the equipment used for each job. A2L refrigerants are not suitable for retrofitting to existing installations.

There are also restrictions on transporting A2Ls, different charge calculations and new tools needed. For more information on this turn to Pages 24-25.

The partner of choice in the transition

Tecumseh will continue to evaluate sustainable alternatives and limit the proliferation of refrigerants on the EU market. Tecumseh believes that now is the time for engineers to start training to use new A2L refrigerants.

The company offers components compatible with redesigned and qualified sustainable refrigerant alternatives – including low-GWP synthetic refrigerants as well as naturals such as CO₂ or propane.

Changing from HFCs to HFOs

Making the switch can be relatively easy on commercial refrigeration systems ranging from 1Kw to 15Kw. A2Ls can be employed on direct expansion cooling systems and are fine alternatives for good technical and economic reasons.

SILENSYS® Advanced condensing units



The SILENSYS® range offers acoustically engineered, streamlined, fully featured and ready to install condensing units. They have exceptionally low noise levels, regardless of the installation conditions. The design means that they can be installed easily and be floor or wall mounted.

All accessories are supplied as standard. The main components can be accessed immediately, ensuring easy maintenance as well as ease of installation for additional control or command components.

The units are suitable for cold rooms, display cases, fermentation rooms, reach-ins, wine cellars and ice machines.

Features and benefits

The units offer a sustainable solution and run on low GWP refrigerants R455A, R454C and R1234yf. SILENSYS® Advanced condensing units address all requirements for stationary refrigeration systems. They are COP & SEPR compliant according to the Eco-design Directive for stationary refrigeration systems and condensing units.

The units are designed to the highest safety standards and should be installed by a qualified contractor. Their design helps prevent refrigerant leaks and the units are tested on an assembly line before being sold. They are appropriate for systems with cooling capacities ranging from 1Kw to 15Kw, are suitable for direct expansion systems and are simple to install.

Acoustics

The compressor compartment of SILENSYS® Advanced condensing units is insulated and the fan blades benefit from optimised geometry.

Compliance

SILENSYS® Advanced condensing units are designed to meet standard series EN378 of systems, ISO5149 and all the directives and applicable regulations. As with all jobs in refrigeration and air conditioning, it is the responsibility of the installer to conduct a risk analysis of the system in its environment before starting work.



Regulatory Bans

2020

New equipment ban on refrigerants with a **GWP greater than 2500** (exemption for equipment cooling products below -50°C).

Service ban using refrigerants with a **GWP greater than 2500** if the charge size is greater than 40T CO₂ equivalent* (approximately 10kgs of R404A).

Use of refrigerants with a **GWP above 150** banned in all new hermetically sealed moveable air conditioning equipment.

2022

Ban on the use of virgin refrigerants of **GWP greater than 150** in new hermetically sealed commercial refrigeration equipment.

The use of refrigerants with a **GWP above 150** will be banned in new commercial refrigeration systems with a capacity of 40kW or more.

N.B. The primary circuit of a cascade system can use a HFC with a GWP up to 1500.

2025

Ban on the use of virgin refrigerants of **GWP greater than 750** in the installation of single split air conditioning systems where the charge size is **less than 3kg**.

2030

Ban on the use of reclaimed refrigerants with a **GWP greater than 2500** to service equipment where the charge size is greater than 40T CO₂ equivalent (approximately 10kgs of R404A).

** Use of certified reclaim refrigerant allowable until 2030.*

Several refrigerants (not just R404A) have a GWP above 2500 and are affected by the New Equipment and Service Ban.

For products not listed please contact Wolseley or A-Gas for more information.

Please note: The F-Gas Regulations are subject to review in 2021/2022. Additional bans may come into force from 2023 onwards.

Product Use

Product	Ban
R404A (under 10kgs)	New Equipment Ban: 2020
R404A (over 10kgs)	New Equipment Ban: 2020 Service Ban: 2020*
Reclaimed R404A (under 10kgs)	New Equipment Ban: 2020
Reclaimed R404A (over 10kgs)	New Equipment Ban: 2020 Service Ban: 2030*
R407F (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R407A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R449A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R448A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022
R410A (in split A/C less than 3kgs)	New Equipment Ban: 2025
R452A (Commercial refrigeration over 40kW)	New Equipment Ban: 2022

* Use of certified reclaim refrigerant allowable until 2030.

Several refrigerants (not just R404A) have a GWP above 2500 and are affected by the New Equipment and Service Ban.

For products not listed please contact Wolseley or A-Gas for more information.

**Please note: The F-Gas Regulations are subject to review in 2021/2022.
Additional bans may come into force from 2023 onwards.**

Where is Your Sector Going?

The A-Gas view on the product trends that are reshaping our industry.

AIR CONDITIONING



R410A

If your equipment contains 3kgs or more, R410A can still be used. If existing equipment is running ok, there is no need to change – continue to service this using virgin or reclaimed product*.

R32

New installations under 3kgs are likely to be on R32. This A2L has a low enough GWP to come under the current 750 threshold.

R466A

Large systems above 3kgs are likely to move to A1, low GWP alternatives such as R466A (Solstice N41) from Honeywell.

TRANSPORT

For larger systems, such as trains and ships, R404A can no longer be used.

R452A is an alternative option that is not currently affected by the F-Gas Regulation. However, with a high GWP of 2141 this may not be a long term solution*.

HEAT PUMPS



Gas boiler installations are to be outlawed in new homes by 2025. This will see the rise of heat pumps using:

R32 PROPANE R1234ZE

COMMERCIAL



Market shift to low GWP alternatives has been high, with use of:

R448A **R449A**

R513A **R452A**

RECLAIMED R404A

also remains a popular choice.

Be aware of the 150 GWP threshold in 2022 on new commercial multi-pack systems above 40kW.

For new installations the market may move to:

R454C **R454A**

R455A **R1234YF**

PROPANE **PROPYLENE**

CHILLERS

There is no current ban affecting the use of HFC refrigerants* in chillers. We expect to continue to see the use of:

R134a **R410A**

R32, **R454B** and **R513A** are alternatives being used in some applications.

Over time, users looking for longer term, low GWP solutions may move to:

R1234ZE **R1234YF**

INDUSTRIAL



As we move away from R404A and R507 in large industrial refrigeration systems, popular choices appear to be natural refrigerants such as:

AMMONIA **R744**

* Availability of HFCs with a high GWP may be affected following the quota phase down. Consider product availability when making your refrigerant choice.

A-Gas encourages you to always seek technical advice before making a product change.

N.B. The F-Gas Regulation is subject to review in 2021/2022 which may result in additional bans.

Reclaimed Refrigerant



A-Gas European Operations Director Rob Parker on the difference between recovered and recycled refrigerants and how both can be an excellent temporary, mid-term solution.

Refrigerant recovery is beginning to play a bigger role in our industry as the ban on the use of high GWP virgin refrigerants (above 2500) in new installations and servicing continues to make an impact.

This and other F-Gas step downs mean that over the years the amount of virgin, high GWP refrigerant available on the market will continue to decline.



A-Gas has invested heavily in expanding reclamation facilities as the industry rises to the low GWP challenge. We have built two new tanks at our site in Portbury near Bristol to increase our storage capacity for reclaimed refrigerants. A-Gas also has a base in Holland at Eyselshoven housing a new refrigerant reclamation facility.

In addition, A-Gas Rapid Recovery is a quick and easy way to recover refrigerant on site at short notice.

Customers have told us that they like the way it saves time on site and reduces costs while helping to maintain business as usual for the end user.

With recycling and reclamation on everyone's mind, we are often asked at A-Gas: "What is the difference between recycled and reclaimed product?" You can be reassured that using either in a system is allowed – within reason – but they are not the same.

Recycled refrigerant

A refrigerant that has been recycled is an uncertified product that is being returned for use on the same site and has not been moved between premises. It's a used refrigerant that has gone through a basic, on site cleaning process, normally carried out by the contractor completing the work.

Unprocessed refrigerant recovered from a system cannot be stored on site for longer than a year due to landfill issues. As soon as you move it from the site – unprocessed or recycled – it is classed as hazardous waste and must be sent, with the appropriate legal environmental paperwork, to a licensed facility for reprocessing or disposal.

Reclaimed refrigerant

A-Gas are reclaimed refrigerant specialists and don't sell recycled gas at all. Reclaimed refrigerant is a gas that has been reprocessed by a licensed facility to the industry standard AHRI 700 to match that of virgin product. It is refrigerant that is purified, certificated and guaranteed.

At our reclamation plants, used refrigerant undergoes chemical analysis, is cleaned of contaminants and goes through our separation plant to produce a product that matches that of virgin refrigerant requirements.

Refrigerant analysis service

Installers should act on the side of caution when looking to re-use recycled products that are not single component refrigerants.

You should be aware that a product can change composition through its life if the system has experienced leaks. This is particularly true for blends of refrigerants, such as the R407 family.

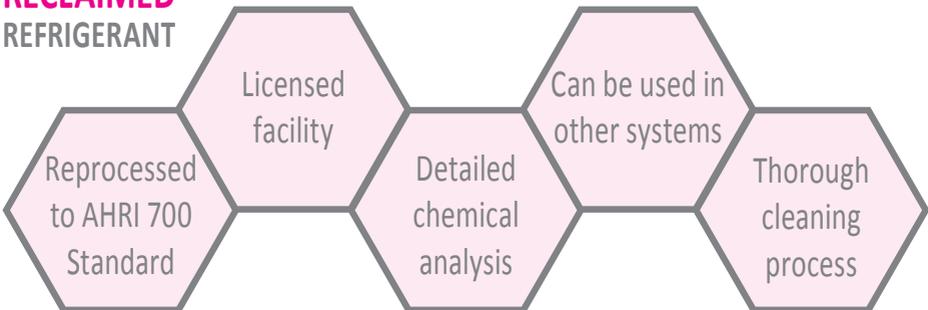
A-Gas offers a refrigerant analysis service at its custom-built lab in Portbury where it can confirm a refrigerant's composition and purity – and in doing so, help relieve that uncertainty.

Working together

Our investment in reclamation facilities highlights the commitment we have to providing the industry with the capacity and infrastructure to support the F-Gas phase downs.

Using certified reclaimed product is a way the engineer can help the industry and the customer in reducing the short-term impact of the F-Gas phase downs – bridging the gap to that time when a decision is needed on choosing a new generation refrigerant or natural alternative.

RECLAIMED REFRIGERANT



R32 and Beyond



A-Gas Managing Director John Ormerod with a guide to working safely with this mildly flammable and other A2L refrigerants.

A2Ls, or mildly flammables, are beginning to make a real impact on the refrigeration and air conditioning industry.

It's no secret that R32 has been championed as an A2L alternative for use in air conditioning split systems. R32 is widely available on the market in a variety of cylinder sizes and from a practical perspective is a good replacement for R410A – a high GWP gas which, like other high GWP products, is under pressure as the quota system takes effect.

Manufacturers already supply equipment which is R32 ready and the message is reaching engineers and end users that this single component gas with a GWP of 675 is a winner – especially when you consider that the commonly used R410A has a GWP of more than 2000.

We have seen over the years that there is no guarantee that any refrigerant is future proof but it is a good bet that R32 will be a preferred option in air conditioning systems for many years to come.

The sooner the industry gets used to using R32 the better positioned it will be to adopt A2Ls when they become mainstream throughout refrigeration.

Excellent alternatives

The availability of virgin HFC refrigerants is something to keep an eye on over the coming years. The quota phase down will continue to have an impact on our industry's supply chain and users are encouraged to move to refrigerants with a low GWP, many of which are mildly flammable.

At A-Gas we believe that the popularity of these mildly flammable refrigerants will grow as the F-Gas phase downs continue. The fact that R32 has already become a preferred choice in air conditioning split systems has shown that A2Ls can be a success and the industry is ready to adopt change.

In addition to the lower GWP when compared to traditional HFCs such as R404A, A2Ls are excellent alternatives due to the lower charge sizes, smaller line sizes and potential cut in running costs.

It is clear to see that A2Ls are workable alternatives on the road to a kinder, more environmentally-friendly future for our industry.

Advances with tools

A2Ls require a different approach and engineers need to be more aware of how to handle them, while also ensuring that they have the right tools to do so.

Users must not retrofit a system operating on a non-flammable refrigerant to an A2L – these mildly flammable products must only be used with new, purpose-built equipment.

Manifolds and hoses are already on the market and enable engineers to do the job safely.

Whatever the task, make sure that you only use approved equipment. If in doubt, always ask. The Safe Seal Charging Hoses, from JAVAC, are a good option for those looking for suitable equipment – see Page 28 for more information.

Recovery

Refrigerant recovery machines and suitable recovery cylinders can only be used which are specifically designed to handle mildly flammable refrigerants.

The good news is that such units and cylinders are available off the shelf to tackle these jobs.

It is not recommended to mix A2L refrigerants with other types of gases in recovery cylinders.

Do not exceed the stated safe weight for the cylinder when recovering the gas – the figure is stenciled on the cylinder – and make sure you complete all the F-Gas records.

Product cylinders

The cylinders containing A2L refrigerants, such as R32, are easily recognisable by the red shoulder, labelling and valve connection.

All A2L cylinder valves have a left-hand thread, whereas standard HFCs have a right-hand thread.



Charge calculations

Mildly flammable refrigerants bring some complexity by introducing the need to do charge limit calculations. You will need to refer to BS EN 378:2016 for the full calculation methodology.

There are several mitigating factors to consider with A2Ls which will include location of equipment, leak detection and ventilation.

Many manufacturers of equipment provide specific guidance. Seek clarity if you are unsure.

Flammables on the road

Transporting A2Ls requires new ways of thinking.

Like all refrigerants, care should be taken when they are moved but also bear in mind that A2Ls are not recognised as a separate classification by the ADR Regulations and the guidance on transporting flammable refrigerants applies.

Vehicles should be ventilated and there should be a fire extinguisher on hand. The appropriate vehicle marking and documentation is also needed.

Training

Training and qualifications are essential. Make sure you and your engineers attend suitable training courses focused on the safe use of A2L refrigerants. See Page 32 for more information on training.

Great future ahead

A2L refrigerants are the next step in refrigeration technology and are instrumental in our industry meeting the phase downs.

With their greater energy efficiency, smaller charge sizes and reduced equipment footprints they have a lot to offer the refrigeration engineer and the end user.

Versatile options: R455A and R454C

R404A, the legacy gas for refrigeration systems, has a GWP as high as 3922. By using an A2L refrigerant you can reduce this significantly.

R455A (Solstice® L40X) and R454C (Opteon™ XL20) both have a GWP of less than 150 and are excellent alternatives to R404A in commercial refrigeration equipment.

If you are still unsure and want further advice, contact your refrigeration suppliers. We are on hand to support you.



A2L Best Practice Guide



- ✔ **Handle A2L Refrigerants appropriately** – ensure you have a well-ventilated work area, which is free of sources of ignition and use appropriate leak detection
- ✔ **Training and Qualifications are essential** – attend suitable training courses for the safe use of A2L Refrigerants
- ✔ Use **additional safety measures where possible**, such as forced ventilation, automatic valve shut-off and pressure switch regimes
- ✔ **DO NOT retrofit to an A2L** – these mildly flammable products must only be used with new, purpose-built equipment
- ✔ **Consult the Safety Data Sheet** and take necessary safety measures
- ✔ Ensure compliance with **Refrigeration Standard EN378**
- ✔ Use the correct **tools and equipment**
- ✔ **Seek further advice** where required
- ✔ Follow the **manufacturer's installation and operating instructions**

A-GAS[®]
TOGETHER WE CAN

agas.com

Safe and Secure



Scott Davies, UK Sales Director for JAVAC UK, explains why their unique Safe Seal charging hoses are the safest way to attach refrigerant hoses to a service port.

When engineers are servicing refrigeration systems there is the potential for refrigerant to spray out from the service port. This can result in refrigerant loss and the risk of refrigerant burn for the engineer. Designed with the user in mind, JAVAC's safe seal charging hoses are the only hoses on the market that feature a special valve that eliminates this risk.

Secure fitting

The ideal addition to an engineer's toolkit, the R32 ready hoses' One-Touch design ensures user safety by securing the fitting connection before starting refrigerant flow.

Engineers simply turn the single knob to tighten the fitting onto the service port. After the valve is fully connected, turning the knob pushes the internal core depressor to activate refrigerant flow from the system. Only once fully secured and sealed can the refrigerant run from the system into the hose. Crucially, thanks to the One-Touch design, refrigerant cannot spray out when connecting the hose to the system.

Safety is improved further with the swivel design. The innovative swivel sleeve ensures that the fitting will not come loose – even if the hose is moved or accidentally tugged on. It also allows free rotational movement, without the fitting becoming loose.

Traditionally hoses without a sleeve, run the risk that a fitting connection will loosen when a hose is moved, resulting in unwanted leaks.

Hose disconnection is just as safe and easy as connection. Turning the knob backseats the core depressor – closing the Schrader valve and stopping the flow of refrigerant. The fitting is then unscrewed from the port by continuing to turn the same knob.

Stopping the flow of refrigerant while the fitting is still securely connected ensures no loss of gas. Once the fitting is safely disconnected, refrigerant inside the hose will remain safely sealed inside, unable to escape to air and can be recovered at a later time.

Quality and efficiency

With years of engineering and servicing experience JAVAC endeavours to deliver the best and most complete range of tools in the industry. JAVAC's safe seal charging hoses make the engineers' job easier and safer while minimising the environmental impact of refrigerant gas.

Innovative, high quality and efficient to use, the hoses are simple to transport and use, while offering JAVAC's market-leading performance.





JAVAC EDGE

For time saving,
hassle-free tools that
make a difference to your
working day – think JAVAC.

Safe Seal charging hoses



JAVAC is the UK's No.1 HVAC/R tool specialist and part of the ASPEN PUMPS GROUP

JM0140 DEC 2019



Registration and Certification



Graeme Fox, Senior Mechanical Engineer at the Building Engineering Services Association, on why registration and certification is a must for all installers in the refrigeration, air conditioning and heat pump industries.

It is all too easy to miss what we've achieved in the refrigeration, air conditioning and heat pump industries in recent years when it has happened slowly and when so much still needs to be done.

But if you take a step back and look at how our industry has changed the achievements are plain to see.

When the original F-Gas Regulation came into force in July 2007 the refrigeration, air conditioning and heat pump sectors had a terrible reputation for poor leak control standards.

Working practices

With an emphasis on improving containment the regulation was successful in focusing the industry's attention on better working practices. In recent years this focus has moved from containment towards changing the landscape within which we operate.

The reference points went from physical charge in terms of kilogrammes to focussing on the Global Warming Potential (GWP) of refrigerants by referencing everything in terms of CO₂ equivalent.

Simultaneously, the regulation has forced a phase down of refrigerants in use by implementing a quota mechanism that reduces sharply over a 15-year period from 2015 to 2030. This has shifted the market direction significantly in a number of ways:

- Equipment manufacturers have developed systems working with different blends and compounds.
- There has been a focus on reclamation and recycling to encourage the use of refrigerants already in the market rather than new virgin products.
- The need for upskilling a contractor base that now frequently works with flammable substances that they were not originally trained to handle has also emerged.

The F-Gas Regulation has been transposed into UK law and is now part of the British legal system. The certification and personnel competence requirements have all been set at the UK level.

F-Gas company certificate

All businesses that install, maintain or service stationary equipment containing or designed to contain F-Gas refrigerants have to have an F-Gas company certificate.

As a result, F-Gas certification bodies such as REFCOM, the Register of Companies Competent to Manage Refrigerants, have grown in importance and have a key role to play within our industry.

Setting standards is key. BESA, the Building Engineering Services Association, from which REFCOM was originally formed, now contains specialist groups to help shape our industry. These range from promoting and improving professionalism, to maintaining the highest technical standards that safeguard our environment.

Improving compliance

As the next step in raising standards, improving compliance should be on everyone's radar, not just that of BESA. In an attempt to achieve this, REFCOM has designed an elite scheme that focuses on enabling manufacturers, wholesalers and distributors of equipment and refrigerants to sign up to a voluntary code of conduct.

The code is designed to ensure that sellers of refrigerants and pre-charged equipment understand the rules of who they can, and perhaps more importantly, cannot sell to.

The code also states that they operate to the spirit of the regulation – not just the actual wording. If you haven't already, I recommend becoming a member of this scheme.

The regulatory landscape we now work in has professionalised our sector at a rate previously thought to be impossible. Registration, certification and compliance now play an integral part in enabling people to work competently in our skilled industry.

Make sure you comply!

For more information



thebesa.com



refcom.org.uk

Train to Gain!

Mike Creamer, Institute of Refrigeration President-elect and Business Edge Managing Director, on why training has a key role to play in meeting the demands of the F-Gas Regulations.



BUSINESSEGE
AIR CONDITIONING & REFRIGERATION SPECIALISTS

Such has been the pace of change with the F-Gas Regulations in the past five years that it is easy for installers to forget that they are legally required to keep up with all these new developments in the workplace.

Under F-Gas, anyone working with equipment containing refrigerant must hold LCL Awards, City & Guilds 2079 or BESA (Category I-IV) Certification.

I understand how difficult it can be when you are busy on the tools to find time for training but if you don't have the right certification to do the job, you are putting people's lives at risk and could face a hefty fine.

With new generation refrigerants already with us there's no time to waste to ensure that you are up to speed with what's new refrigerants' wise.

A2Ls have emerged as ready-made alternatives to high GWP refrigerants. The success of the A2L R32 in split-system air conditioning is evidence that lower-flammables are here to stay.

But there's no need to be fazed about working with A2Ls. You can learn about new charge calculations, changes in handling, transportation, ventilation and unfamiliar tools quickly and easily.

*Training is good
for your business.
With the right certification
it opens up new streams of
revenue by highlighting your
competency to customers.*

Your reputation is key to the success of your business and training has a vital role in maintaining this.

More change is on the way with the F-Gas Regulations in the years to come and this will have a significant effect on our workplace.

But if you're not sure about what to do when working with A2Ls or any other new generation refrigerants, don't panic – help is on hand.

Authorised training providers have the expertise to help you rise to the high-GWP challenge in a way that will suit you and your business.

Jargon Buster

Wolseley and A-Gas often answer questions from engineers about the terminology relating to our industry. Our experts have put together a brief guide for you to refer to on the go.

F-Gas

F stands for fluorinated. F-Gas is the term used to describe a particular family of fluorinated gases widely used as refrigerants.

GWP

The GWP or Global Warming Potential of a refrigerant is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It allows for the comparison of the global warming impact of different gases. CO₂, by definition, has a GWP of one regardless of the time period used and is the gas used as the reference. See Page 35 for a GWP summary list.

CO₂ equivalent

This is a measure for describing how much global warming potential a greenhouse gas may cause using the functionally equivalent amount or concentration of carbon dioxide (CO₂) as the reference.

Quota

A quota system has been introduced to control refrigerant sales in the EU and UK market. This will affect all HFC producers, importers and exporters and is based on control of bulk HFC production, import and export. There are additional controls for the import of pre-charged products.

Phase down

The F-Gas Regulation was implemented on Jan 1 2015. The regulation puts in place an HFC phase down from 2015 to 2030 by means of a quota system and bans on high GWP refrigerants in Europe.

HFC

Hydrofluorocarbons are a refrigerant class made up of carbon, fluorine and hydrogen. These contain the higher GWP refrigerants phased out under the F-Gas Regulation and include products such as R404A.

HFO

HFOs or hydrofluoro-olefins are an unsaturated compound of hydrogen, fluorine and carbon. HFCs and CFCs are saturated. HFO refrigerants have a much lessened GWP than HFC alternatives but there is concern that HFO refrigerants have a much higher flammability rate than HFCs. HFOs include products such as R1234YF.

Retrofit

Removing a refrigerant from a system and replacing it with another compatible product that offers the required performance.

Recovery cylinder

Cylinders used to return recovered refrigerant that the customer no longer requires. They have a yellow valve guard and a dual port valve to enable push-pull recovery of gas. They may contain traces of oil and other contaminants and are not suitable for A2L refrigerants or Ammonia.

Receiver cylinder

Cylinders used as a temporary storage vessel for refrigerant that the engineer wishes to re-introduce into a system. These cylinders with a yellow and black banded valve guard and dual port valves enable push-pull recovery of gas. They should be returned to A-Gas empty. They are not suitable for A2L refrigerants or Ammonia.

Reclaim

Recovered refrigerant material sent to a licensed facility such as A-Gas to undergo a thorough cleaning process that is reprocessed to the same standard as AHRI 700 material.

Recycle

This is where recovered material has undergone a basic cleaning process for re-use on the same site. Be aware that moving recycled refrigerants between sites is prohibited due to waste transfer restrictions.

Global Warming Potential

R744 (CO ₂) GWP 1	R1270 (Propylene) GWP 2	R290 (Propane) GWP 3	R600A (Iso-butane) GWP 4
HFO1234YF GWP 4	Opteon™ XL10 (R1234YF) GWP 4	HFO1233ZD REF GWP 5	HFO1234ZE GWP 7
Opteon™ XL20 (R454C) GWP 148	Solstice® L40X (R455A) GWP 148	Opteon™ XL40 (R454A) GWP 238	R515B GWP 293
Solstice® L20 (R444B) GWP 296	Opteon™ XL41 (R454B) GWP 466	Solstice® N13 (R450A) GWP 604	Opteon™ XP10 (R513A) GWP 631
R32 GWP 675	Solstice® L41Y (R452B) GWP 698	Opteon™ XL55 (R452B) GWP 698	Solstice® N41 (R466A) GWP 733
Solstice® N40 (R448A) GWP 1387	Opteon™ XL40 (R449A) GWP 1397	R134a GWP 1430	RS-70 (R453A) GWP 1765
R407C GWP 1774	Isceon MO49 Plus (R437A) GWP 1805	R407F (Performax LT) GWP 1825	R410A GWP 2088
R407A GWP 2107	Opteon™ XP44 (R452A) GWP 2140	Isceon MO59 (R417A) GWP 2346	Isceon MO29 (R422D) GWP 2729
RS-52 (R428A) GWP 2999	Isceon MO79 (R422A) GWP 3143	R404A/ Reclaimed R404A GWP 3922	R507/ Reclaimed R507 GWP 3985

(GWP values based on Assessment Report 4)



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