

REASONS WHY HFO REFRIGERANTS ARE A STRONG ALTERNATIVE TO NH3/AMMONIA

PILLAR 5 - STANDARDISATION



INTRODUCTION

When installing an industrial chiller in a food, beverage, or dairy setting, it is important to consider whether NH₃ (Ammonia) is indeed the most appropriate refrigerant solution.

In food and beverage processes, it has been a traditional approach to have the cooling process applied by an "Industrial" cooling system, typically using ammonia as refrigerant. Some reasons are based on unconscious bias, some other reasons are the "natural" aspect of ammonia.

But now companies that need a mild freezing cooling system are increasingly turning to Hydrofluoroolefin refrigerants – known as HFOs – to improve sustainability, boost performance, and significantly reduce costs.

The ideal refrigerant for these sectors needs to be non-toxic, non-flammable, non-explosive, non-corrosive, not harmful to the environment, cheap and easy to produce / work with and have good thermodynamic properties. Luckily, HFOs meet this criterion. And simply put, HFO solutions are always lower cost versus NH₃/ammonia.

HFO refrigerants are categorised as having zero ozone depletion (ODP) potential and low global warming potential (GWP) and R1234ze is a synthetic refrigerant, rather than a natural refrigerant like ammonia. Interestingly the GWP value of R1234ze is less than the GWP another natural refrigerant CO₂ (being 1) and importantly R1234ze doesn't create TFA (trifluoroacetic acid and its salts).

Here we look at the aspect of standardisation of products.

IS AN AMMONIA CHILLER A STANDARDISED PRODUCT?

Every ammonia system is unique and entirely bespoke to each individual process application it will need to cool. That said, ammonia chillers are therefore a non-standard product and cannot simply be taken off the shelf from pre-existing chiller stock.

Ammonia is highly toxic, volatile, and explosive, flammable and corrosive. Chillers using ammonia are non-standard, with operation governed by stringent safety standards. Every ammonia system is unique and must be customized to a specific process application, with a raft of complex requirements at every stage – from risk assessment to installation and servicing.

**PROCESS TEMPERATURE CONTROL SPECIALISTS.
SALES. HIRE. SERVICE.**

Our International Offices: England and Wales: 0800 840 4210 | Ireland: 04692 52934 | Scotland: 01698 7445 40 | France: 01 60 66 80 83
Germany: 0800 0116 0117 | Netherlands: 088 258 2580 | Belgium: 0800 29 110 | Austria: 01236 81 73 | Switzerland: 055 505 66 22

As a result, if companies in the food and beverage sector have a predisposition or leaning toward an ammonia refrigeration system for a new process line or site expansion, there will be several added time requirements that will need to be factored in at every stage of a new chiller project:

- Initial project feasibility study (FEED, front end engineering design)
- Site survey
- Risk Assessment
- Design
- Manufacture
- Delivery, offloading and positioning
- Installation and pipework
- Commissioning

It is easy to see how a project can take many months to undertake, which can have a detrimental affect on a customer's ability to operate affectively in the meantime.

HFO ALTERNATIVE – 10 REASONS A STANDARDISED CHILLER IS THE BEST CHOICE

1) Production efficiency and costs

When a chiller manufacturing process is geared toward producing a standardised product, lower production costs are achievable because of economies of scale and the availability of standardised components and materials. This in turn means competitive pricing can be passed on to customers in the food and beverage industry.

2) Easier to scale production in line with demand

With a standardised HFO chiller production process, production can be ramped up in line with increased demand far easier than non-standard ammonia chiller production processes, which are far more bespoke and less adaptable as a result. Companies can scale standardised processes more easily than customized or adaptable processes. This ultimately means that HFO chiller manufacturing lead times can be kept to a minimum and customers' project deadlines can be met with relative ease.

3) Ease of installation

Delivery, lifting and shifting, installation and final commissioning of HFO chillers can be undertaken swiftly and trouble free by a Service Engineer, aside from any new pipework requirements that need to be factored in. Extra

ICSCOOLENERGY.COM

care, time and expertise will be required to do the same for an ammonia chiller, meaning higher costs, more safety precautions and lengthier timescales which can impact a food or beverage facility's production schedule.

4) Greater predictability of how the chiller will work

With a standardised HFO chiller, it will be manufactured according to a standardised and proven manufacturing processes and has been tested and used in various customer applications and settings. Knowing how a chiller performs at certain and different condition is very important to avoid unwanted surprises. Standardisation avoids any unpleasant surprises, like not cooling effectively or in the right time frames for example. Having predictability of your chillers parameters and operational ability is important for Process Engineers and Facilities Managers to have peace of mind their new chiller will be fit for purpose. An ammonia chiller will be unpredictable for the most part and fill place a lot more variables and uncertainty on process conditions and the staff tasked with overseeing them.

5) Extensive knowledge of the model/range and all the components within it

With standardised HFO chillers there is extensive knowledge and information available on the range and models with in it, especially with the components used in building them and how they behave within different process applications and conditions. Furthermore, spare parts will be kept as standard and service engineers will be able to repair and replace easily and effectively. Ammonia chiller spare parts will be different from system to system and the likelihood of spares being as readily available when so many system variations is decreased, and changing them will take extra care, safety, time and money.

6) Greater flexibility and interchangeability

Once an HFO chiller is in place it will provide consistent and accurate process cooling. However, if it were to be taken out of action for maintenance or in the unfortunate event of a breakdown, a replacement rental chiller could be easily called upon to avoid any costly downtime and keep production operational 24/7. Equally, should a replacement chiller model be required for any reason, it can be exchanged for a like-for-like model, or swapped for a model offering higher capacities/different parameters if offered through ICS FLEX. Once an ammonia chiller is in situ it is there indefinitely and fully lacks flexibility and interchangeability.

7) Quality is consistent

As HFO chillers are produced to a standardised process the quality of production is consistent and to pre-defined and rigorous benchmarks, which is a lot harder to do when each product varies so widely. This means that the chillers produced are uniform in every way, any inconsistencies will stand out and it's less likely that the chiller will fail when it is mobilised to cool the process it is purchased for.

8) Easier compliance

Ensuring an HFO chiller remains compliant can usually be taken care of simply and hassle free by planned chiller servicing and maintenance by FGas compliant Service Engineers, depending on the amount of refrigerant in the system this can be anything from once to four times a year. In contrast an ammonia system will be subject to far more rigorous and specialist checks and document keeping ensuring it remains in the same parameters of compliance. Just to be able to operate an ammonia chiller, a person needs to be certified accordingly which can take 2 years to become and needs recertifying every 3 years.

9) Reduced waste and alignment with greener initiatives

When manufacturing HFO chillers to standardised processes is far easier to keep on top of recycling, waste reduction and keeping things "green". When bespoke ammonia cooling plant is being manufactured, there will be variations in components and processes to satisfy the individual nature of each machine, making it harder to keep to pre-agreed recycling, waste, and sustainability management initiatives.

Trane Technologies is committed to zero waste to landfill across the company by 2030. Since 2019, seventeen ICS Cool Energy operations have achieved this designation. While our non-hazardous waste to landfill increased by 12% in 2020, we reduced the amount of hazardous waste disposed by 13%.

Our manufacturing sites reuse and recycle waste to not only conserve natural resources and reduce pollution, but also to create cost-saving opportunities for our business.

Packaging material is the primary waste our manufacturing facilities send to landfill. We are increasing our returnable packaging program and evaluating options to participate in packaging cooperatives while expanding our network of global recycling partners. Our corporate procurement standards for suppliers restrict once-used packaging for our preferred suppliers.

10) Brand loyalty

Supplying consistent and standardised HFO chillers promotes brand loyalty and understanding of the products and its capabilities. Process/Facility Engineers will in turn gain confidence and an affinity with ICS Cool Energy's low GWP refrigerant solutions.

SUMMARY

HFOs have zero ozone depletion potential (ODP) and near-zero global warming potential (GWP). HFO-based chillers are a standardised product.

By using a standard product, the customer will have proven performances, optimized design, the best quality / costs combination, and the use of service programs and teams that are well defined for the best long-term performances... HFO chiller performance is predictable and, with spare parts as standard, our highly-experienced and knowledgeable Trane technicians can solve issues promptly – and supply replacement chillers on a rental basis if needed.

HFO cooling systems can substantially reduce the Total Life Cycle Cost of your investment and are ideal for almost every application – a perfect cooling alternative to ammonia.

- Ease of maintenance and operation
- Low GWP
- Standardised range of products with fast customisation options
- Proven performance
- Compact footprint

7 REASONS TO CHOOSE AN ICS COOL ENERGY HFO CHILLER OVER AN AMMONIA CHILLER

- Cost effective solution
- Zero Toxicity