

Industry insight.  
A chilling story  
of counterfeit  
refrigerants.

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# Quality counts.

**Trade in counterfeit and poor quality refrigerants is on the increase, bringing with it a host of potential consequences, ranging from poor process performance at one end of the scale, to costly damage to capital equipment at the other end. In the most extreme circumstances, counterfeit and inferior refrigerants can potentially result in loss of life.**

Refrigeration is a part of everyday life. Food is chilled, frozen, stored, transported and displayed in refrigerated units using refrigerant gas. Refrigeration is also a key component of many industrial processes such as pharmaceutical, chemical and natural gas production. Even motor vehicles, trucks, offices, shops and public buildings are kept cool by air conditioning.

“The refrigeration and air conditioning industry is primarily operated by a pool of reputable global manufacturers and marketers of refrigerant gases, but there are also a growing number of less reputable dealers and this is creating a lot of variation in quality,” says Jon Black, Global Head of Chemicals and Refrigerants, Linde Gases Division.

“In unpacking the root causes of the problems besetting the refrigerant and air conditioning industry, we’ve identified two specific focus areas — counterfeit products and poor quality products. Very often those in the industry use the word ‘counterfeit’ to cover all the issues, but there are very definitely two themes at play here”.

Counterfeit products are products sold that infringe trademarks of other companies. Many refrigerants are manufactured by large international companies, marketed under brands such as Suva®, Forane®, Solkane® and Genetron®. Additionally, major distributors such as Linde sell refrigerants under their own brand, providing customers with assurances over quality and reliability.

So the challenge is to address the substantial problem of counterfeit products marketed with packaging that has been copied — providing false promises to the customer.

“This has become a real concern worldwide. On the simplest level, as with a fake Rolex watch, it might work well, but equally, it may not. Critically, the product doesn’t come with the usual guarantees. Both trademark protection and brand reputation is being violated and the customer has a false understanding of what he’s purchased.”

Black says the other focus area is poor quality of refrigerants. Driven by the expiration of many sales patents, and also global product shortages, there has been a dramatic increase of new suppliers entering this market. These new suppliers, often providing products emanating from China, offer refrigerants that range in quality from high specification right down to the sub-standard.

Independent risk management organisation, Lloyd’s Register, issued a safety alert in November 2011 highlighting the fact that with the international phase-out of HCFC R-22, this refrigerant is becoming increasingly difficult and costly to obtain. As a result, it has been reported that some service contractors are mixing dissimilar refrigerants in air conditioning and refrigeration systems.

Lloyd’s Register cautioned that this practice carries significant risks, including possible violation of European and national standards. In addition, the mixed refrigerant cannot be reclaimed and must be destroyed at considerable cost to the contractor or the equipment owner.

“The use of inferior cylinders also has a bearing on the quality of the refrigerant. Inferior quality cylinders, sometimes falsely stamped as CE approved, (the CE marking is an indication that the product meets all provisions of the relevant legislation set down by the European Union) bring with them the very real risk of explosion, leading to injury, loss of life, costly damage to capital equipment and plant downtime.”

“Worst of all, there are the bogus suppliers whose package labelling claims the content to be a specific refrigerant, yet the contents are quite different.” he continues. “For instance, instead of non-ozone depleting hydrofluorocarbons (HFCs) such as R134a, the product may actually contain environmentally damaging hydrochlorofluorocarbons (HCFCs) or chlorofluorocarbons (CFCs).”

There have been a number of cases where imitation products contain flammable gases such as propane, despite being labelled as containing non-flammable HFCs. Whilst hydrocarbons such as propane and isobutane can be used in refrigeration applications — they are used in the majority of domestic refrigerators and freezers — it must always be a conscious decision to use them. Installers and service engineers need to ensure the refrigeration installation is designed to use such gases, to ensure safe equipment operation.

## What is the impact?

These factors impact the end user in a variety of ways, since the end user often cannot be confident of the contents in the cylinder he puts to work in his operation, unless he know unequivocally that he has purchased the refrigerant from a reliable source.

When operating with an unexpected gas, the end user could start to experience system performance issues. For example, they may discover that energy consumption is poor, leading to substantially higher energy costs. More seriously however, imitation refrigerants may cause system failures. Firstly the refrigerant may consist of unexpected chemicals that are not compatible with the refrigeration system – causing hoses, seals and the like to suffer damage. Secondly, the pressure temperature characteristics of the gas may be different to what is expected. This can cause major issues such as flooding of the compressor, causing it to malfunction.

In other words, systems begin to run incorrectly and equipment breakdown is the result. As little as 2% of the wrong chemicals present in a refrigerant mix can cause costly system failure. Methyl chloride, or chloromethane (R40), has been named by German compressor manufacturer GEA Bock as a constituent in fake refrigerants responsible for an increasing number of compressor breakdowns. GEA also warns of refrigerants found to be a cocktail of R134a, R22 and sometimes propane, that carry operational and safety risks.

The more serious incidents make the headlines. A UK newspaper reported in 2011 that reefers — refrigerated shipping cars — were causing a worldwide panic after multiple units exploded in Vietnam and Brazil, killing three dockworkers. In the United States, cable news channel MSNBC said faulty refrigerant was the likely cause of the explosions. This refrigerant was in use in up to 8,000 container cars that underwent maintenance in Vietnam during that year and 2,000 of these units were grounded as a result of the introduction of counterfeit refrigerant.



In response to this incident, major global refrigerant manufacturer DuPont Fluorochemicals issued a statement to customers explaining that one of the primary refrigerants used in refrigerated shipping containers is R-134a, which is manufactured by DuPont and other companies. R-134a was introduced in the early 1990s and is used in a range of applications. It has been extensively tested for both performance and compatibility with various materials and has been demonstrated to be safe for its intended uses in refrigeration and air conditioning systems.

“R-134a has been the subject of counterfeiting by unscrupulous suppliers who pass off other products for R-134a to unsuspecting users,” read the statement. “DuPont has an active programme in place to enforce the proper use of its trademark and trade name in this market and to bring counterfeiters to justice. At this point, we do not know the composition of the refrigerant used in the refrigerated shipping containers at the time of the explosions,” it continues.

In December 2011 importers, wholesalers and retailers of a batch of R-134a in Fiji were instructed to halt imports and remove the refrigerant sourced from a particular supplier from their shelves while investigations were conducted into the purity of the product. According to the packaging, the cylinder contained R-134a, but tests conducted by the Fiji Department of Environment, proved otherwise. This discovery was made by chance, while the inspector was demonstrating the use of a refrigerant identifier to customs officers at a local workshop. The R-134a was found to be cross contaminated with CFCs and HFCs.



## Environment.

There are also environmental implications. Counterfeit or poor quality refrigerants may deplete the ozone layer and contribute more to global warming than they should. This issue occurs due to poor equipment operating efficiencies leading to higher power consumption, or system failures that increase the chance of refrigerant leakage into the atmosphere.

In January 2012, MACS and Neutronics, a provider of gas analysis and gas handling technologies, issued a warning advising that all industries using R-134a refrigerant immediately test all cylinders thought to be virgin R-134a, owing to reports of widespread contamination.

Janet Smith, DuPont public affairs spokesperson, said in an article published in the US publication, UnderhoodService, that counterfeit refrigerant products, produced by unscrupulous suppliers to resemble leading brands of refrigerant, are a significant and growing concern in the industry.

“Counterfeit refrigerants pose a global threat, for both stationary and mobile applications, because they may be unsafe for use and pose quality and performance issues for users,” Smith said. “Unlike genuine registered products that are tested for their impact on health and the environment, counterfeit refrigerants can contain unknown or toxic ingredients. These can be harmful to end-users and have the potential for negative impact to equipment and/or the environment.”

Smith advised shop owners and technicians to buy refrigerant from reputable, known suppliers as a best defence against the threat of counterfeit refrigerants.

In 2011 the Dubai-based publication Middle East Climate Control interviewed Paul Sanders, Managing Director of Honeywell Fluorine Products on the subject. Sanders commented that in the refrigerant sector, the impact of non-regulated replacement products finding their way into air conditioning, chiller and plant cooling systems can be literally poisonous.

“Generally, substandard components are used which have not been tested or certificated. This means performance is below par – very damaging for chillers and refrigeration plants and, of course, industrial, domestic and tower air conditioning systems.”

“We breathe the air these systems pump out and facility and operations managers can be looking at costly repair or replacement as the gases are not fit for purpose and, in some cases, highly flammable and toxic. You then have to factor in downtime, costs and the potential for spoiled goods. Not forgetting the impact on the environment from CFCs and their negative impact. The major issues really are safety, performance and the environment.”

## Impact across the spectrum.

Comments Black: "So we're seeing the impact of counterfeit and poor quality refrigerant across the spectrum from poor plant operation, system breakdowns and environmental damage, and even fatalities."

"Unscrupulous operators have seen an opportunity to profit in a market that is unfortunately beset by product shortages and price hikes. Refrigerant supply shortages, especially for HFCs, more than doubled refrigerant prices between 2008 and 2011. Supply and demand is also aggravated by legislative change and shortage of raw materials."

"In determining what can be done to address the scourge of counterfeit and sub-standard refrigerants, the message to customers is very clear," Black concludes. "Only source your refrigerants from well-known providers or companies who distribute the products for these main manufacturers. If a new distributor appears on the market, audit this company well and be suspicious if the price appears too good to be true."

"As suppliers, we must never be complacent. We must have correct processes in place that ensure product quality remains high. We must audit our supplier base to ensure only high quality providers are used, operate product quality management systems such as ISO 9001 to ensure our operations, including storage, and filling processes are of high quality."

"Linde Gases Division has been a leading supplier of refrigerants to the refrigeration and air conditioning market for more than 40 years and sells these refrigerants in more than 40 countries throughout Europe, Africa, Asia and South Pacific regions. Linde is an organisation that prides itself on quality and we want to be a part of the solution."

# Getting ahead through innovation.

With its innovative concepts, Linde is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde offers more. We create added value, clearly discernible competitive advantages, and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardized as well as customized solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimization, and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

Linde – ideas become solutions.



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