

Why Transition to Low Global Warming Potential Refrigerants: What does it mean for you?

Since the inclusion of hydrofluorocarbons (HFCs) in the international Kyoto Protocol climate treaty in 1997, various governments around the world have been considering regulations to reduce the use of high global warming potential (GWP) refrigerants. California's journey began in 2014 with Senate Bill 1383 directing the California Air Resources Board (CARB) to reduce emissions of these short-lived climate pollutants (SLCPs) by 40% compared to 2013 levels by 2030. This is one of the most ambitious emission reduction goals in the world and it will impact HFC refrigerants and other products used today. CARB is developing regulations with a proposed deadline to transition air conditioning by 2023.

Some of the new low-GWP refrigerant blends contain components characterized by ASHRAE as having a comparatively low burning velocity and are classified as A2L.

- It is more difficult to ignite these fluids than it is to ignite highly flammable fluids like hydrocarbons.
- It is less likely that these fluids will sustain a flame than highly flammable refrigerants.

A2Ls Around the World

A2L refrigerants (A2Ls) are used around the world today as various countries have already started the transition to low-GWP alternatives. In 2012, there was a quick transition in Australia due to a very high carbon tax on refrigerants. Greater than 50% of air conditioners sold there today contain A2L refrigerants. The industry quickly partnered with other stakeholders to analyze all aspects of the supply chain related to the transition and there have been no incidents reported to date related to A2Ls.

Unfortunately, there have been some very serious incidents related to the use of hydrocarbons as refrigerants where there was no stakeholder analysis. Hydrocarbons are listed by ASHRAE as higher flammability refrigerants, or A3s. They are controlled tightly in the U.S., with only very small quantities allowed in sealed (self-contained) systems or appliances.

Japan has also done significant work related to the adoption of A2Ls. They have carefully examined potential issues and worked to eliminate them using a risk analysis model. Thailand and other countries in the developing world have followed their guidance in the fast adoption of A2L refrigerants.

Why Regulate Refrigerants?

It is estimated that a global phasedown of HFCs will reduce global temperature rise by up to one half degree centigrade by 2100.

Regulation of HFCs in air conditioning and refrigeration is one of the ways to reduce greenhouse gas emissions, especially since air conditioning and refrigeration are the fastest growing sectors using high-GWP HFCs.

ASHRAE Safety Classification of Refrigerants

SAFETY GROUP			
F L A M M A B I L I T Y	Higher Flammability	A3	B3
	Flammable	A2	B2
	Lower Flammability	A2L	B2L
	No Flame Propagation	A1	B1
		Lower Toxicity	Higher Toxicity
		INCREASING TOXICITY	

Toxicity is classified based on Occupational Exposure Limit (OEL). OEL \geq 400 ppm by volume is classified as class A.

Flammability is classified based on a flame propagation test, lower flammability limit (LFL), heat of combustion (HOC), and maximum laminar burning velocity (BV). LFL \leq 0.10 kg/m³ or HOC \geq 19 kJ/g is classified as flammability class 3.

A2Ls in the U.S.

In the U.S. approximately 60% of the new automobiles sold today contain A2L refrigerants. In Europe, nearly all new vehicles contain them. The auto industry worked together with refrigerant producers through the Society of Automotive Engineers (SAE) to complete a similar safety analysis. The same refrigerant producers are assisting with the development of safety standards for air conditioning and refrigeration. One important fact they shared from earlier research is that A2L refrigerants create the exact same combustion products as the nonflammable refrigerants that have been in use worldwide for decades. In fact, these same companies and others already offer these low-GWP refrigerants in Europe where regulations related to this transition are approximately six years ahead of much of the rest of the world.

U.S. industry is taking this transition very seriously and is following, and in many cases tightening, best practices from around the world.

- The Air Conditioning Heating and Refrigeration Institute (AHRI) is leading a supply chain analysis through its Safe Refrigerant Transition Task Force. This group will have a special focus on the most common types of equipment used in the U.S.
- The U.S.-Canadian safety standard, UL/CSA 60335-2-40, has reduced the allowed refrigerant charge size by one half compared to the amount allowed by the companion international standards. It also requires additional measures to reduce risk.
- Over the past 10 years, the industry has examined hundreds of reports and commissioned several tests. More recently, a more than \$6 million collaborative research program jointly funded by the Department of Energy, ASHRAE, AHRI, and CARB explored how flammable refrigerants might ignite and how they burn if released.
- ASHRAE, North American Technician Excellence (NATE), and others are developing new training and testing programs for contractors and technicians installing and maintaining equipment containing A2L refrigerants. ASHRAE is also developing a separate safety standard for residential applications that is focused on clearly communicating safety requirements to contractors and technicians.

There are those around the world that have accused U.S. industry of being too cautious and slow in this transition, but we take the safe use of these products very seriously and will continue this careful approach.

Please contact us if you are interested in more information or visit ahrinet.org/policy/saferefrigerant.

Did You Know?

Ammonia and hydrocarbons were some of the first refrigerants used over one hundred years ago.

Ammonia is classified as a B2L flammable refrigerant.

Safety standards now control their usage in the United States.

Contact AHRI if you would like more information about the Safe Refrigerant Transition Task Force:

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