

Fike ECARO-25™ Frequently Asked Questions (FAQ)

This document is aimed at those giving sales presentations to enable them to answer queries raised by the audience.

1) What is ECARO-25™?

A) Initially, ECARO-25 was introduced into the market as a Halon replacement system only. ECARO-25 was acronym for **E**xtinguishing **C**lean **A**gent **R**etrofit **O**ption, a Fike product containing DuPont™ FE-25™, a clean agent fire extinguishant also known as HFC-125. Fike has since released ECARO-25 for the new system installations and for Halon 1301 replacement projects as well.

2) What is HFC-125?

A) HFC-125 is a hydrofluorocarbon. HFC-125 is Pentafluoroethane as listed in NFPA 2001 and ISO 14520. The chemical formula for HFC-125 is CF_3CF_2H .

3) What is FE-25™?

A) As a fire-extinguishing agent, HFC-125 is referred to as FE-25™, a trademark of DuPont™. FE-25™ is a clean agent fire extinguishant that is electrically nonconductive, non-corrosive, free of residue, has zero ozone-depletion potential (ODP) and is an environmentally preferred alternative to Halon.

4) Why is the agent HFC-125 considered to be the preferred alternative for Halon 1301 in existing systems?

A) HFC-125 is most similar to Halon 1301 as determined in comparative, third party testing for agent storage, delivery, and distribution. HFC-125 closely matches Halon 1301 in terms of physical properties such as flow characteristics and vapor pressure. The pressure traces, vaporization, and spray patterns for HFC-125 nearly duplicate that of Halon 1301.

5) Why ECARO-25?

A) ECARO-25 provides features and benefits in terms of the agent physical properties system design making it the most cost-effective clean agent system for both new installation and the replacement of Halon 1301 systems.

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The ECARO-25 System is THE easiest Halon 1301 “drop-in” replacement system. ECARO-25 has the advantage of being able to reuse the existing Halon 1301 piping structure. ECARO-25 reduces the cost of conversion and minimizes business interruption when replacing Halon 1301 in total flooding systems. To deliver the same level of protection and in most cases, only the agent storage container and system nozzles must be replaced. ECARO-25 requires minimal system modifications, minimizes downtime, reduces costs of conversion and protects what matters most.

6) Why does Fike come out with ANOTHER gas/agent?

- A) HFC-125 offers the end-user the most cost effective solution and returns benefits to the fire protection industry that Halon 1301 offered to the fire protection industry.

In addition, HFC-125 is the best fit for Halon replacement for minimum disruption to the system user at a competitive price. The HFC-125 is complementary to the HFC-227ea product. HFC-125 satisfies the need in the EU community and other markets that have or continue to regulate the use of Halon systems without requiring a complete new installation. The pipe work can be reused with minimal disruption to the protected facility.

7) Where was ECARO-25 when we introduced HFC-227ea and why didn't we start with ECARO-25 agent in 1994?

- A) In the early 1990's, HFC-125 was a leading alternative to replacing Halon 1301 in total flooding fire suppression systems. At the time, the key criteria for use of an alternative to Halon 1301 in occupied spaces was that the design concentration (extinguishing concentration + a 20% safety factor) was below the measured No Observed Adverse Effect Level (NOAEL). For HFC-125 this concentration is 7.5%. At this time (1993), the design concentration for Class-A hazards was determined using Class-B fuels (n-heptane). Since the minimum design concentration of HFC-125 against a heptane fire is over 11% (above the NOAEL) and **the best available methodology for characterizing safety in use IN 1993** was a safe concentration must be below the NOAEL, DuPont stopped development of HFC-125 for use in areas where people are present.

Current science, through the use of PBPK modeling, identified that ECARO-25 is safe for human exposure for short periods (5 minutes or less). The PBPK modeling approach is endorsed by the US EPA, NFPA and is included as part of the new ISO 14520 standard.

The fire protection industry agreed that using heptane to model the protection of computer rooms, etc. was forcing end-users to use more extinguishing agent than is really necessary. As a result, the industry agreed on a new Class-A hazard test (also known as a plastics test) to

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measure the extinguishing concentration of the various clean agent alternatives. For HFC-125, the design concentration is 8.0%. Under the current NFPA 2001 standard guidelines, HFC-125 can be used in occupied spaces up to a concentration of 10.0% providing egress from the room can be expected in five minutes or less. This is the same as the criteria being used for the use of many of the inert gas systems being installed today.

8) Are there toxicity problems with ECARO-25?

- A) ECARO-25 can be used safely in Normally Occupied Spaces for the protection of Class-A assets (Computer Rooms, Data Centers, Clean Rooms, etc). The National Fire Protection Association 2001 Standard for Clean Agent Fire Extinguishing Systems lists HFC-125 as an acceptable halocarbon agent for spaces that are normally occupied and designed to concentrations up to 11.5% by volume with a maximum 5-minute exposure time.

HFC-125 is also listed on the EPA Significant New Alternatives Policy "SNAP" Program as an approved Halon 1301 replacement.

9) Why did the toxic test fail in the early 90's when this was being researched?

- A) In the early 90's the industry utilized heptane cup-burner values to establish Minimum Extinguishing Concentrations. For HFC-125, it was measured at 8.7% and the LOAEL or maximum concentration for occupied spaces was 10.0%. Adding the safety factor to the extinguishing concentration, as required by NFPA, did not permit HFC-125 systems acceptable for use in occupied spaces without lockout devices.

Two primary events have occurred allowing HFC-125 as a viable alternative for occupied spaces:

First, the industry determined that using heptane as the basis for the extinguishing concentration for Class A fires, such as those found in computer rooms, was causing excessive amounts of agent to extinguish fires. As a result, the industry created new realistic Class "A" fire tests. Under these tests, the HFC-125 Class "A" extinguishing concentration is 6.7% which safely permits HFC-125 to be used in normally occupied spaces.

Secondly, the industry has accepted a new toxicity modeling methodology that incorporates the time of exposure element. This was driven by the use of Halon for many years at concentrations above its NOAEL. Essentially, this model has determined that HFC-125 can be used at

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concentrations up to 11.5% for occupied spaces where egress can be expected in 5 minutes or less.

10) Is ECARO-25 in the NFPA 2001 and ISO 14520 Clean Agent Standards?

A) Yes. The clean agent utilized in ECARO-25 is HFC-125 (Pentafluoroethane) and is included in both current editions of NFPA 2001 and ISO 14520.

11) Why was ECARO-25 first introduced for Halon replacement only?

A) Several countries signatory to the Montreal Protocol have introduced a systematic mandate for Halon 1301 systems to be replaced with an environmentally acceptable product. HFC-125 was identified as a potential agent for this specific use due to its superior hydraulic performance. It was introduced for this purpose with just FM approvals. ECARO-25 is now available for new installations as well as Halon 1301 replacement.

12) When I expand my HFC-227ea system can I use ECARO-25?

A) No. The NFPA 2001 Standard does not permit the mixture of two gases in one enclosure. If the enclosure has one agent and the protected space has increased, requiring an increase in agent, the original agent should be supplied or the entire system should be changed over to a new agent. Change to a new agent would require flow calcs to validate the existing pipe network would work with the new agent.

13) When and if I have to recharge my HFC-227ea can I use ECARO-25?

A) No. We do not recommend refilling HFC-227ea containers with ECARO-25.

14) How available is ECARO-25?

A) ECARO-25 is available through the approved distributor network. Fike Corporation has selected domestic as well as international distributors to provide this service.

15) How long will my system be down if I need a refill?

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- A) This will vary depending on location. Fike Corporation has a well-established distribution network in major markets offering quality and timely service for Fike installed systems. Most ECARO-25 systems can be returned to full service within a few days.
- 16) Is ECARO-25 a proprietary product?**
- A) Yes. ECARO-25 is a Fike Corporation product.
- 17) Is HFC-125 targeted for phase-out?**
- A) No. As a hydrofluorocarbon, or HFC, HFC-125 is part of a group of chemicals that are not currently targeted for phase-out and are not expected to be phased-out in the future.
- 18) Is HFC-125 available long-term?**
- A) Yes. HFC-125 is available worldwide and will be available long-term. HFC-125 has the lowest environmental impact of any of the HFC products, which have been commercialized in the fire protection industry. HFC-125 provides the best combination of benefits to the end-user from an environmental and commercial perspective for the replacement of Halon in existing systems. HFC-125 is also a significant component of many of the refrigeration blends being used today to replace CFCs. In total, the benefits of HFC-125 and its utility in many applications make it likely to have long-term viability in the fire protection industry.
- 19) Will Hydrofluorocarbon's (HFC's) be banned in the future (rumors spread by the inert gas people)?**
- A) There are no plans to ban the use of HFC's for fire protection. The European Commission sponsored a study that showed that fire protection use of HFC's was essentially non-emissive and minuscule compared to other uses. The Kyoto Protocol, which manages the control of Global Warming Gases, does NOT in any way require the phase-out of HFC's for fire protection.
- 20) Is it dangerous to use a gas over its NOAEL (no observable adverse effect level)?**
- A) HFC-125 is one of the most extensively tested gases. The PBPK model shows that the take-up of gas in the blood is very slow and that with an appropriate egress time from a protected space the gas is perfectly safe. In simple terms, the PBPK model incorporates the "time" factor when

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evaluating acceptable human exposures. Most of the Halon systems installed in the past were designed at concentrations above Halon 1301's NOAEL.

21) Can someone stay in the protected space after a discharge?

- A) As with all fire situations people should move away from a fire rather than towards it. The products of combustion from burning material in the hazard are extremely noxious and we recommend all personnel evacuate a space prior to discharge. The standards recommend that all personnel leave a protected space within 5 minutes of the discharge of extinguishant.

22) What is the right concentration to use?

- A) Fike and DuPont™ have undertaken extensive testing, much of it in front of independent authorities to determine the correct concentrations. The majority of installations are Class "A" fuels which require a Minimum Extinguishing Concentration (MEC) of 6.7%. Adding the factor of safety gives design concentrations of 8% in the USA Specified markets and 8.7% in European Specified markets. Class B type fuels will generally require higher concentrations.

23) How does HFC-125 extinguish the fire? How does the chemical reaction take place?

- A) The unique mechanism HFC-125 relies upon, is its ability to absorb, at a molecular level, the heat energy from the combustion reaction. The ability of HFC-125 to absorb heat faster than the amount of heat generated by the combustion reaction essentially ceases the combustion reaction since it cannot sustain itself. The ability of HFC-125 to form free radicals, which chemically interfere with the chain reaction of the combustion process, also aids in the extinction of the fire.

Extinguishing mechanism comparison:

	HFC-125	HFC-227ea	Halon	Inert	Foam
Oxygen depletion				100%	
Heat absorption	67%	67%	15%		
Reaction interruption	33%	33%	85%		
Reaction barrier					30%
Cooling					70%

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24) What are the end products after the fire has been extinguished?

- A) HFC-25 systems are aimed at the market that requires early detection and early extinguishing to minimize fire and smoke damage. Keeping the fire small avoids noxious products of combustion of an unchecked fire. HFC-125 is a very stable chemical, which only decomposes in the presence of fire to extinguish it (as did Halon). Very low concentrations of HF can be formed, however they are usually at lower concentration levels than the toxic combustion products of the fire itself. Refer to separate paper on the subject.

25) Is HFC-125 safe for the environment? Who says so?

- A) HFC-125 has zero ozone depletion potential and a short atmospheric lifetime. Over the other HFC alternatives it offers the smallest impact and best combination of performance and environmental impact.

26) What is the PBPK model for HFC125?

- A) The PBPK model is intended to incorporate the time of exposure factor with the toxicity of a specific chemical to determine a safe use level for fire protection. This model is considered to be the “best available toxicity” modeling. For HFC-125, this model would suggest that HFC-125 could be used up to 11.5% providing a person could reasonably egress a room in 5 minutes or less.

27) What is the difference between HFC-125 and HFC-227ea?

- A) HFC-227ea and HFC-125 have identical fire extinguishing mechanisms, however the physical properties of HFC-125 makes it superior to HFC-227ea by way of design, agent quantity, and overall environmental impact.

The natural vapor pressure of HFC-125 (195 psi) is very close to that of Halon 1301 (200 psi), which allows flexibility in pipe design and agent storage location. The flow properties of HFC-125 are much better than HFC-227ea, which only has a natural vapor pressure of 66 psi.

The vapor density specifically makes HFC-125 superior to HFC-227ea. The first advantage is agent quantity. The vapor density of HFC-125 reduces the required amount of agent by 20% as compared to HFC-227ea. One (1) pound of HFC-227ea will only protect a volume of 29 ft³. A single pound of HFC-125 will protect a volume of 36 ft³.

Secondly, and compared to HFC-227ea, the vapor density of HFC-125 also improves the agent hold time by ~19%. The lower vapor density

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helps maintain the mixed (agent/air) gases from separating. The lower vapor density allows for a faster mixing with the air in the enclosure on discharge and helps maintain the agent in the enclosure for the industries minimum target time of 10 minutes.