Bob Friedman

Moderator Larry Faciane

R-454B Puron Advance A2L

Bob Friedman

Moderator Larry Faciane

R-454B Puron Advance A2L

How R454-B Complies with Agency Requirements

R454-B OVERVIEW

Why R-454B?

R-454B	R-32	R-410A
Leader in regulatory. Puron® Advance will be compliant until at least 2034	Short term solution. Will begin phase-out in 2029	Short term solution. Anticipated changes before 2025
GWP 466	GWP 675 Over 200 pts higher than R-45B	GWP 2088
Lower discharge temperatures • Fewer design changes to the compressor and fewer design changes for higher ambient temperatures • Lower discharge temperatures are also associated with longer reliability	Higher discharge temperatures When compared to R-454B	Equal or lower discharge temperatures When compared to R-454B
Little to no glide	No glide	Little to no glide

R454-B OVERVIEW

Why the Change?

AGENCY REQUIREMENTS

Product Transitions

Transition date	Equipment	Requirement	Where[1]?
January 1, 2024	Chillers	SNAP Rule 21 Refrigerants ban GWP ≤ 750	12 States - CA, CO, DE, MA, MD, ME, NJ, NY, VA, VT, WA, RI National [2]
January 1, 2025	Res and Light CML Stationary A/C	GWP ≤ 750	California, Washington National[2]
January 1, 2026	VRF	GWP ≤ 750	California, Washington National[2]

R454-B OVERVIEW

Refrigerant Make-Up and Comparison: Puron Advance vs. Puron vs. R-32

Puron Advance became our leading choice for replacing Puron due to the performance similarities between the two and, ultimately, because it has a much lower GWP than R-32. That difference in GWP is expected to allow Puron Advance to remain compliant significantly longer than R-32. Because of these factors, we will be using Puron Advance in all of our ducted and ductless residential products and our light commercial products.

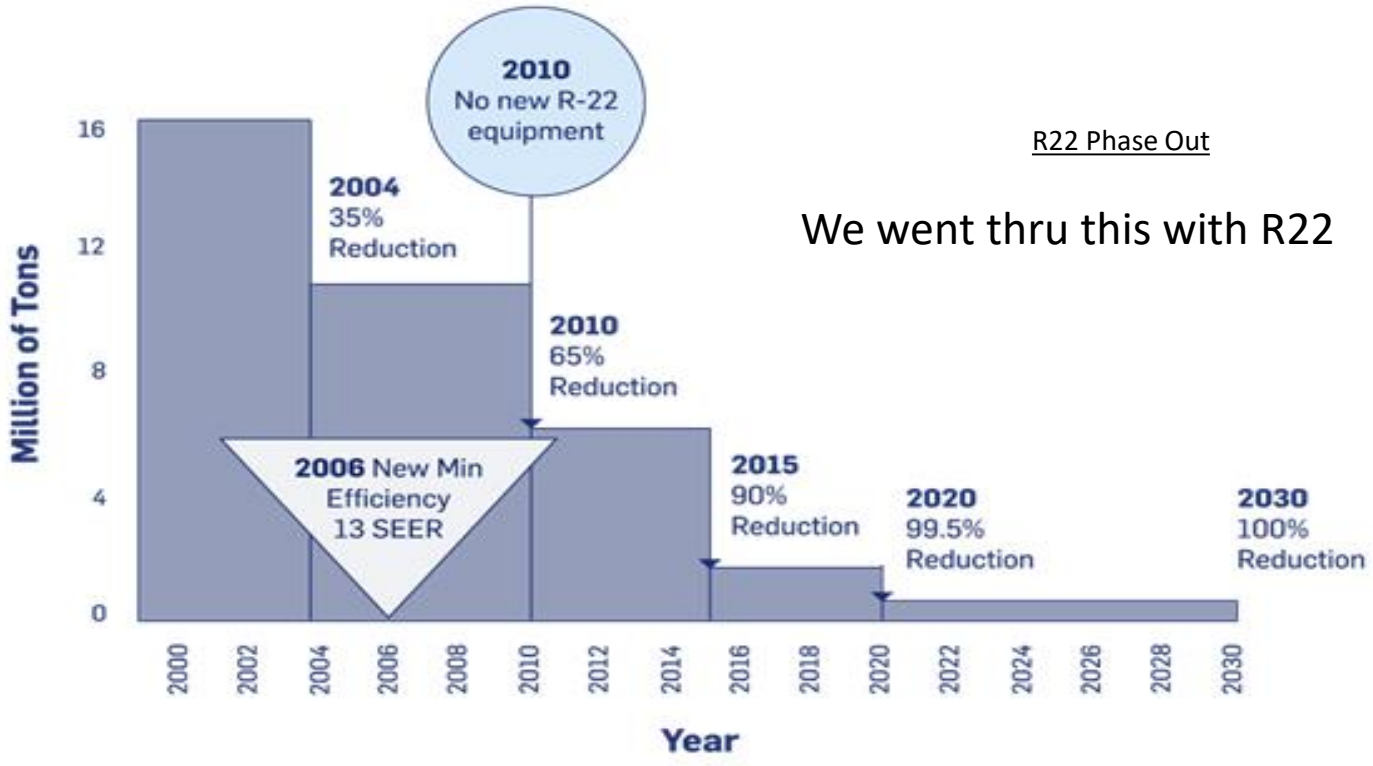
To give you a little more insight into our decision to go with Puron Advance, here's a closer look at the high-level similarities and differences between the three refrigerants:

	Puron	Puron ADVANCE	R-32
	Non-compliant with new unit manufacturing as of 1/1/25	Compliant for Phase 1 of low GWP alternatives	Compliant for Phase 1 of low GWP alternatives
GWP	2088	466	675
Discharge Temperatures	Lower discharge temperatures	Lower discharge temperatures	Higher discharge temperatures
Glide	No glide	Little to no glide	Little to no glide
Formula	50% R-32/50% R-125	68.9% R-32/31.1% R-1234yf	100% R-32

R454-B OVERVIEW

Why the Change?

AIM ACT – HFC SUPPLY WILL BE RESTRICTED



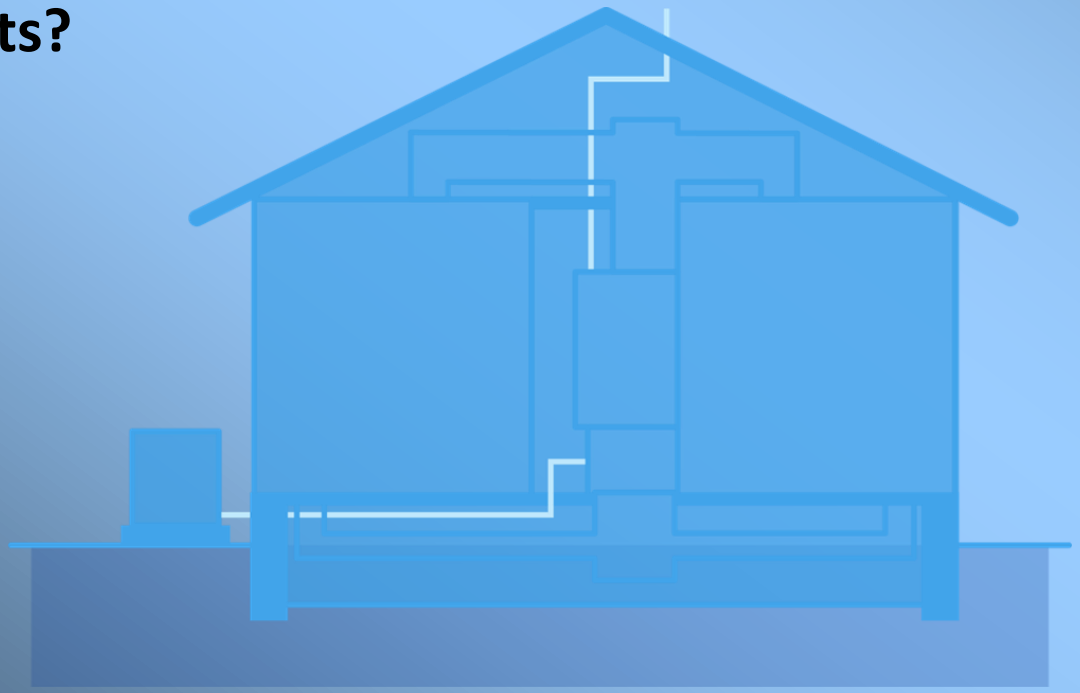
R22 Phase Out

We went thru this with R22

AGENCY REQUIREMENTS

What do the agencies require for A2L refrigerants?

What did we do to comply, using R454-B specifically?



AGENCY REQUIREMENTS

Refrigerant Charge Limits

What the UL states that manufacturers must do:

Refrigerant Charge Limits: Mitigation		
m1	3.9 lbs.	Dissipation system not required
m2	33.9 lbs.	Dissipation system required
m3	169.3 lbs.	Dissipation system in addition to other requirements

Dissipation system can use:

- Continuous fan
- Leak detection-activation system
- Other

AGENCY REQUIREMENTS

Refrigerant Charge Limits

WHAT WE DID TO COMPLY:

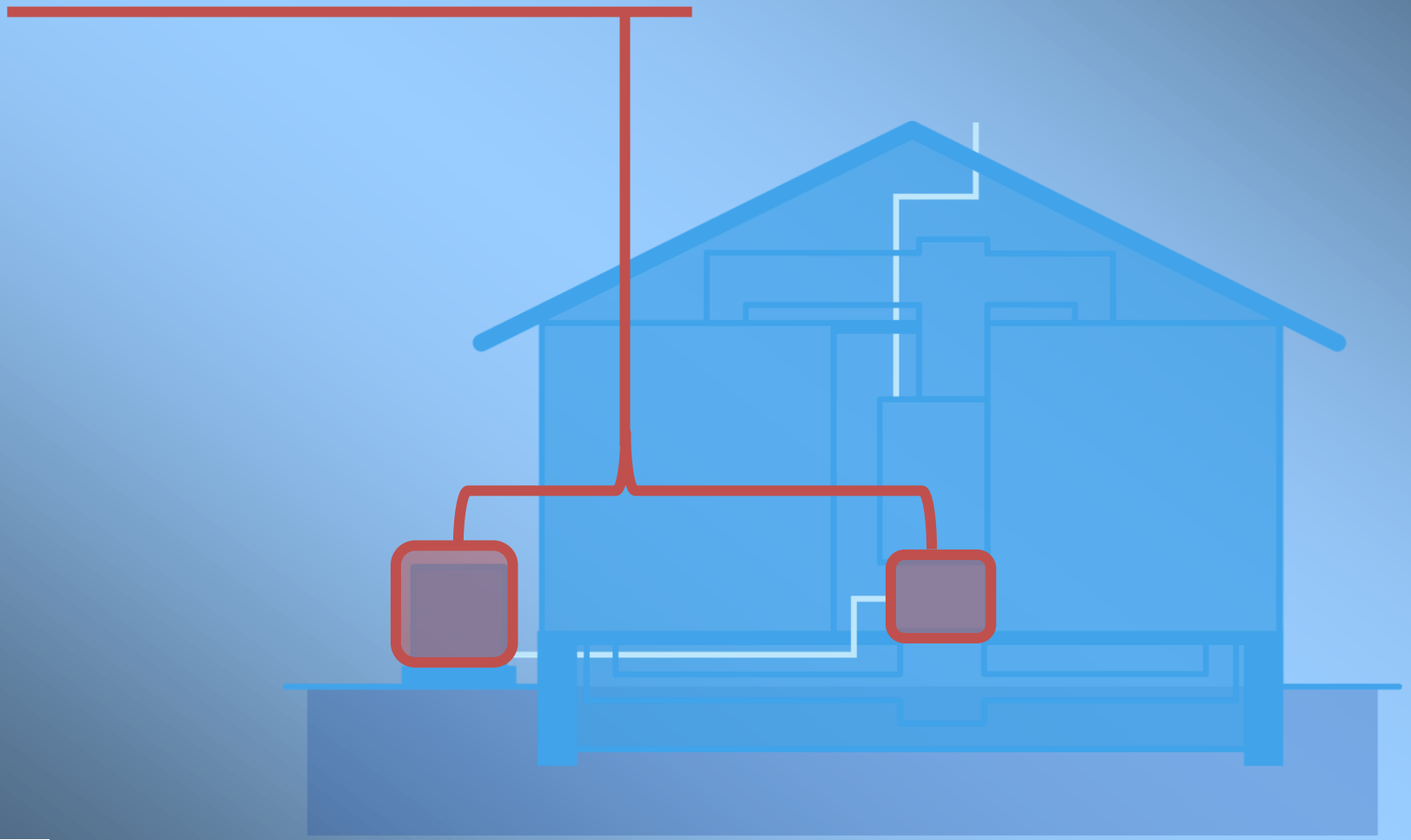
Refrigerant Charge Limits: Mitigation		
m1	3.9 lbs.	Dissipation system not required
m2	33.9 lbs.	Dissipation system required
m3	169.3 lbs.	Dissipation system in addition to other requirements

- All systems comply with m2 requirement
- Dissipation system: Leak detector activates unit fan; controlled via mitigation board

ALL of our units have safety measures in the design

AGENCY REQUIREMENTS

Charging Label

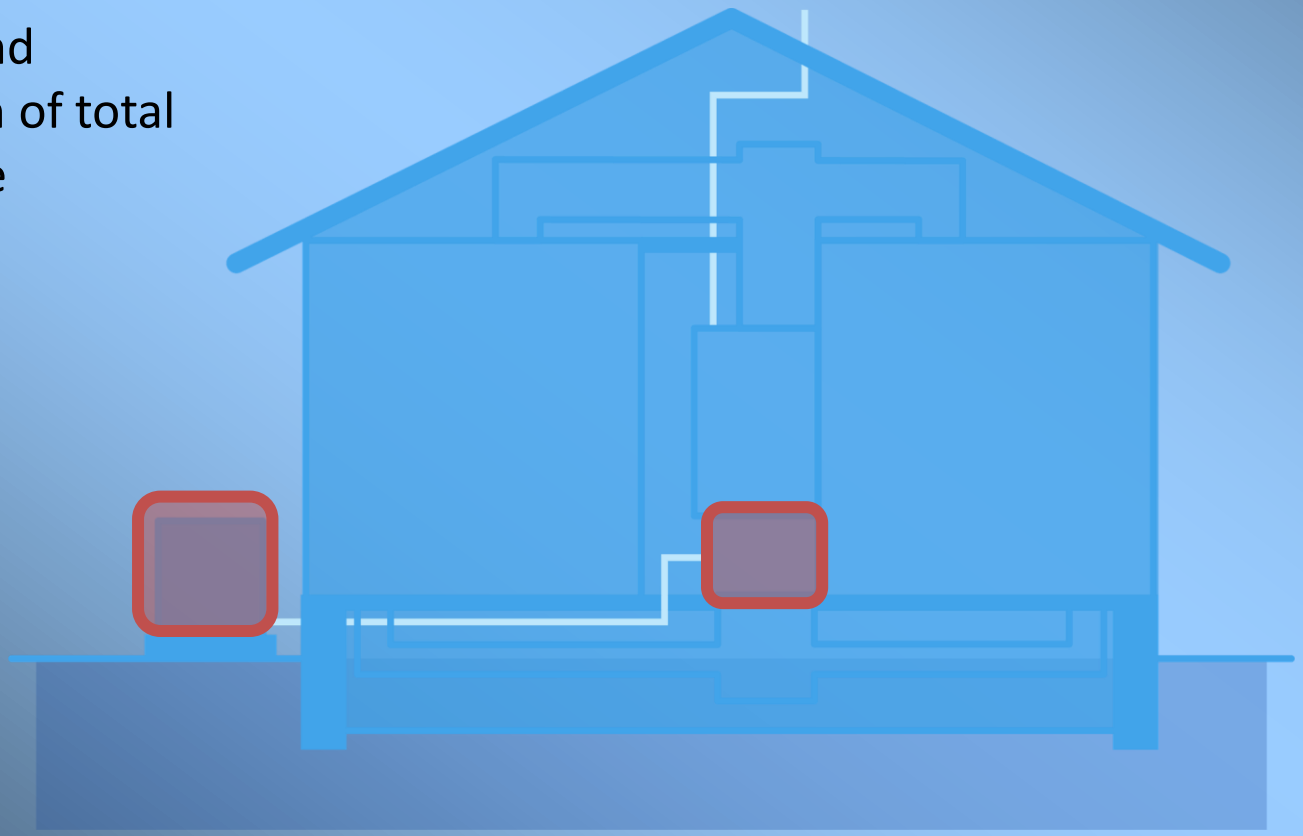


AGENCY REQUIREMENTS

Charging Label

What agencies state that manufacturers must do:

- Tracking and verification of total unit charge

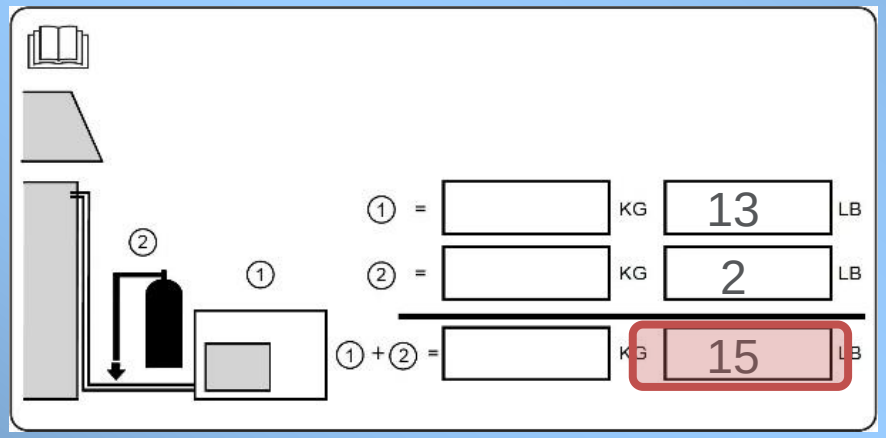


AGENCY REQUIREMENTS

Charging Label

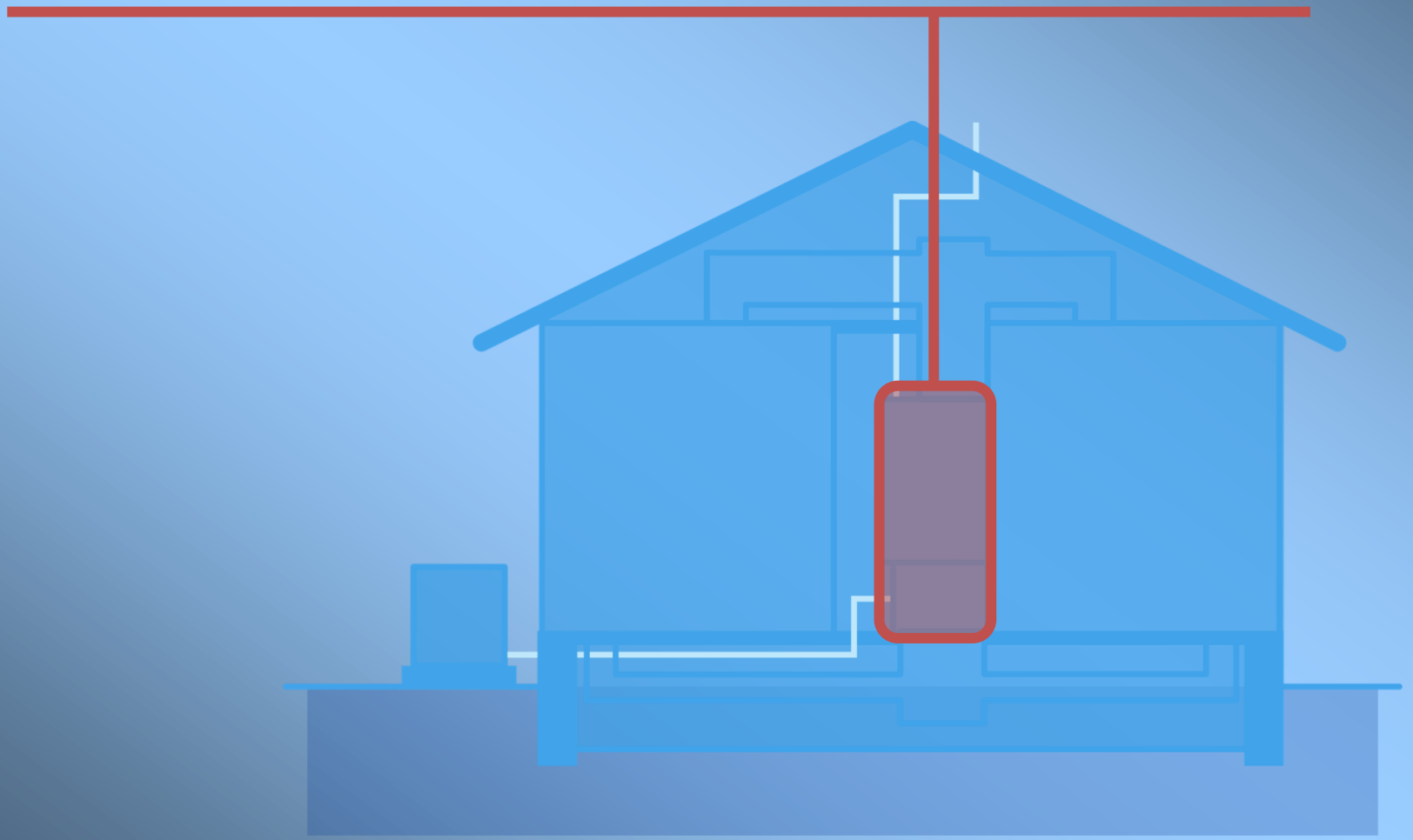
WHAT WE DID TO COMPLY:

1 = Unit Charge
2 = Line Set Charge
3 = (1+2) = Total Charge



AGENCY REQUIREMENTS

Factory Installed Leak Detection

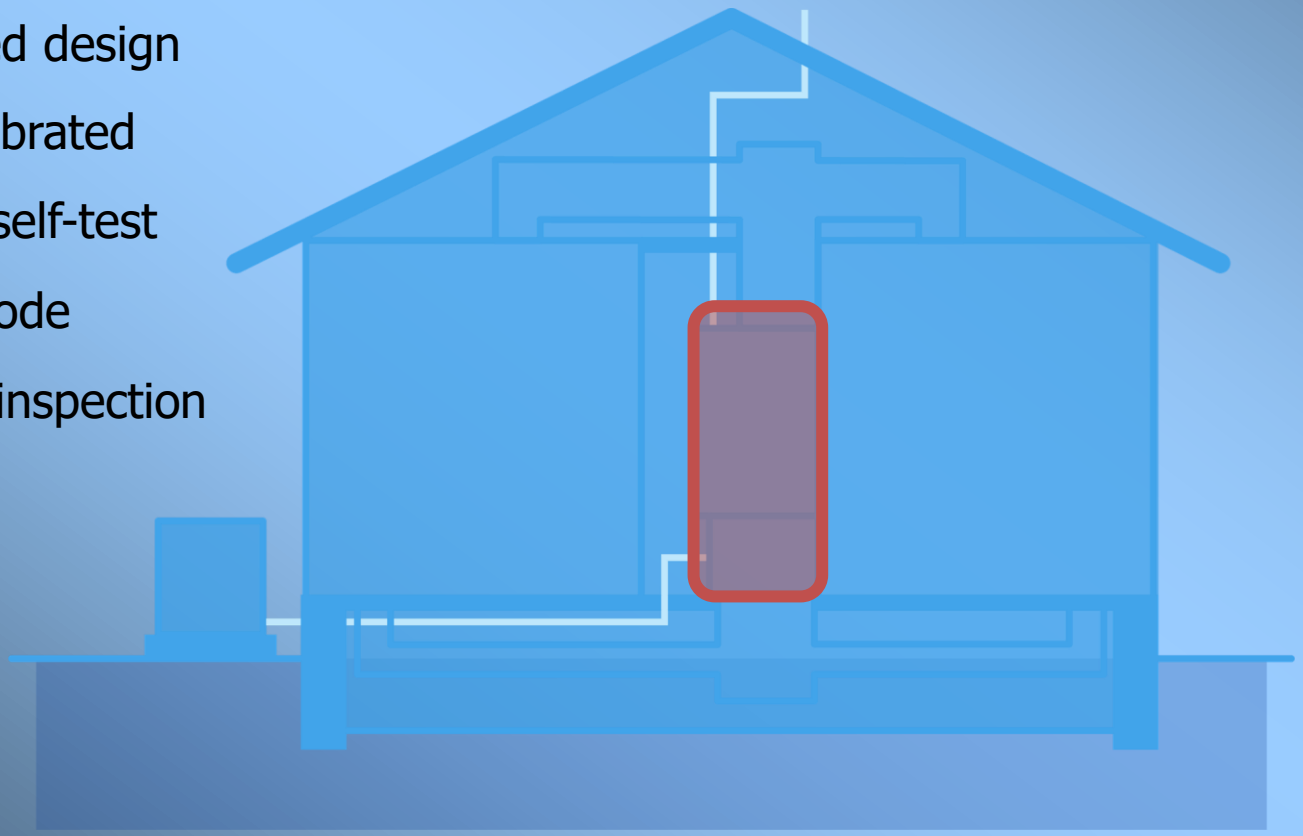


AGENCY REQUIREMENTS

Factory Installed Leak Detection

What agencies state that manufacturers must do:

- UL-approved design
- Factory calibrated
- Automatic self-test
- Fail-safe mode
- Allow field inspection



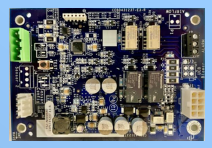
AGENCY REQUIREMENTS

Factory Installed Leak Detection

WHAT WE DID TO COMPLY:

Unit-installed leak detection

- Continually scans for R454-B leak
- Mitigation threshold = 20% LFL
- Located in lower cabinet
  - Adjustment required for horizontal install



* Actual part design and location may vary

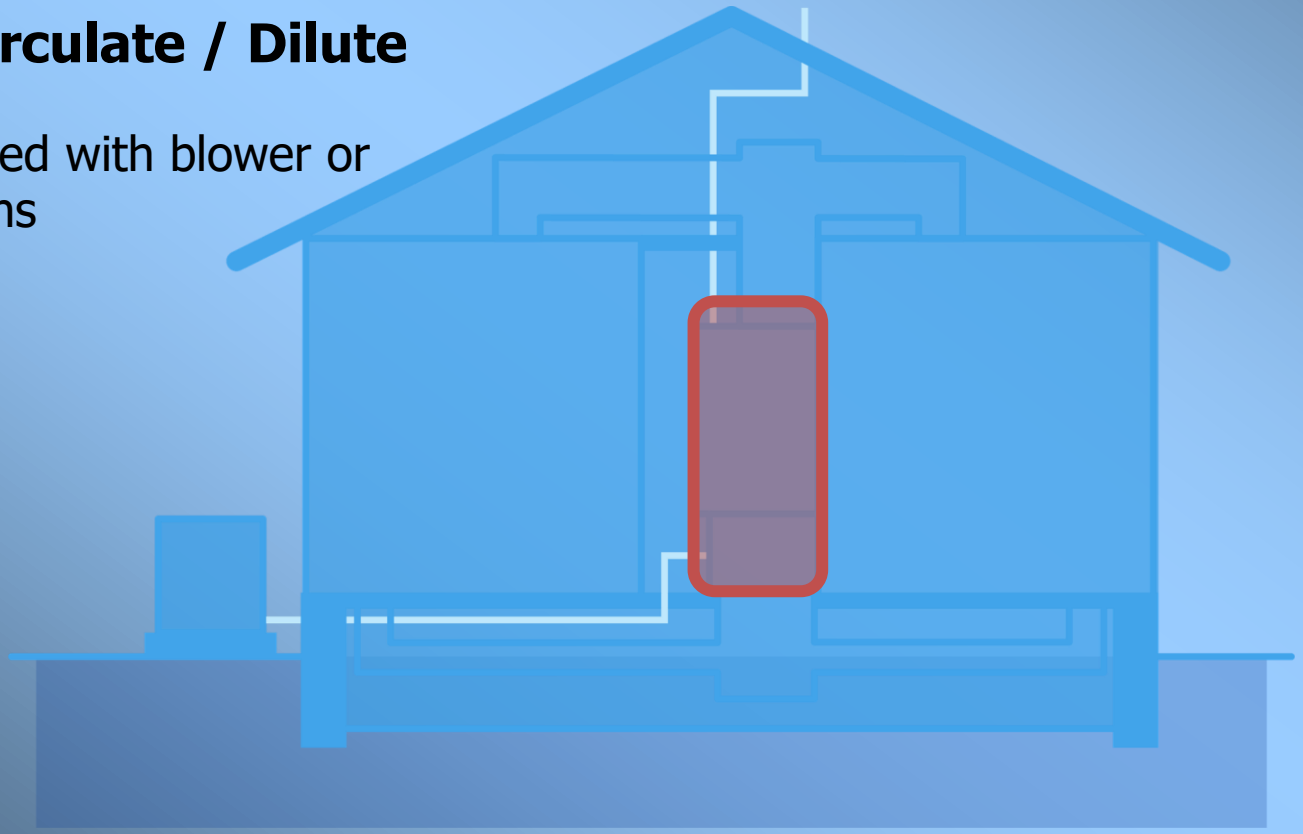
AGENCY REQUIREMENTS

Active Mitigation for Leaks

What agencies state that manufacturers must do:

Detect / Circulate / Dilute

- Accomplished with blower or external fans



AGENCY REQUIREMENTS

Active Mitigation for Leaks

Indoor Equipment

- Factory-Installed Leak Detection must be:
  - UL-approved design
  - Factory calibrated
  - Automatic self-test
  - Fail-safe mode
  - Allow field inspection

AGENCY REQUIREMENTS

Active Mitigation for Leaks

Indoor Equipment

- Unit installed leak detection:
  - UL approved
  - Continually scans for R454-B leak
  - Mitigation threshold = 20% LFL
  - Located in lower area of coil cabinet
    - Adjustment may be required for horizontal install

AGENCY REQUIREMENTS

Active Mitigation for Leaks

Indoor Equipment

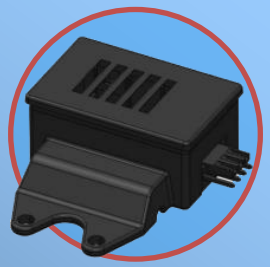
- Fan coil
  - Mitigation board will come factory installed
  - Sensor will be mounted to the coil for vertical application
  - Horizontal application may require sensor re-location to factory marked location

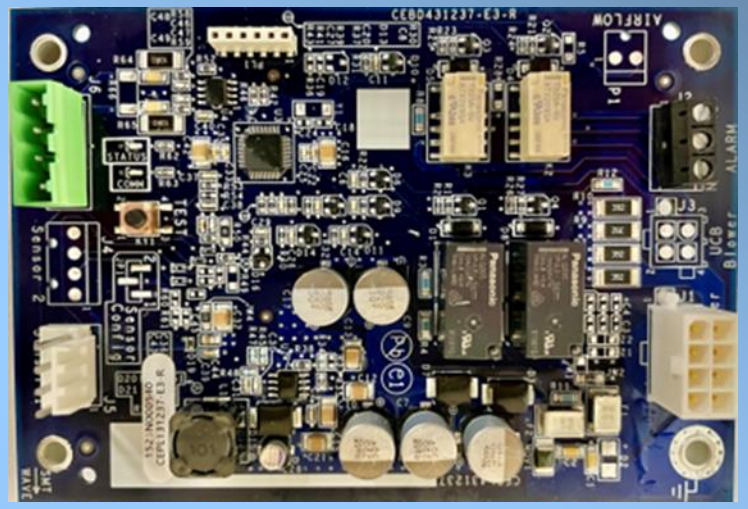
AGENCY REQUIREMENTS

Active Mitigation for Leaks

Dissipation System

- Blower always on in mitigation mode



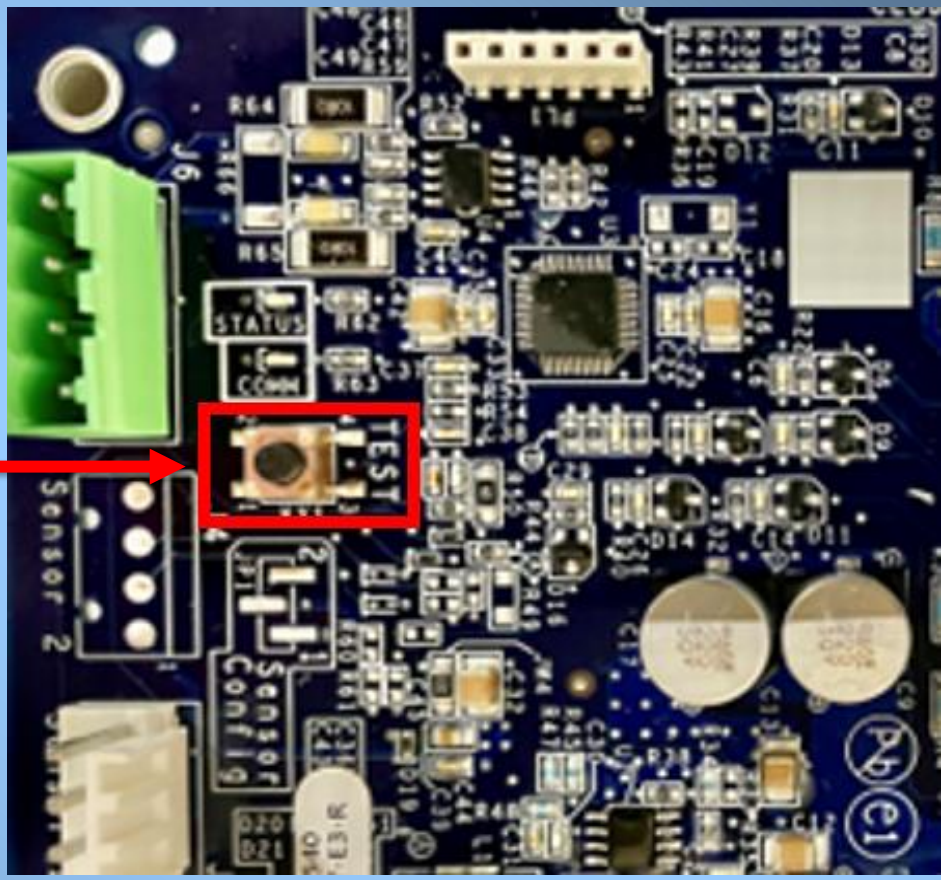


AGENCY REQUIREMENTS

Active Mitigation for Leaks

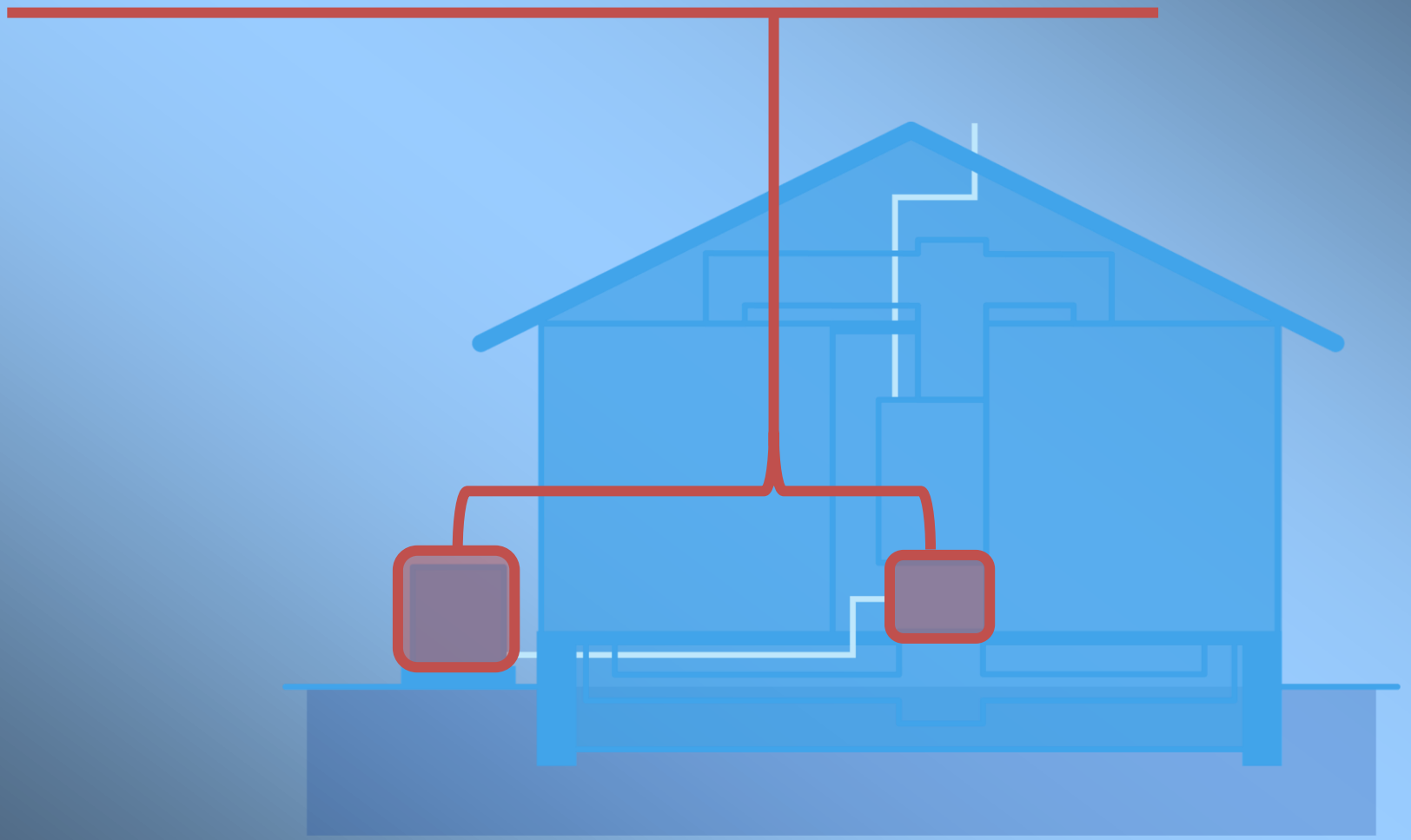
Dissipation System

- Self-test button



AGENCY REQUIREMENTS

Ignition Source Isolation

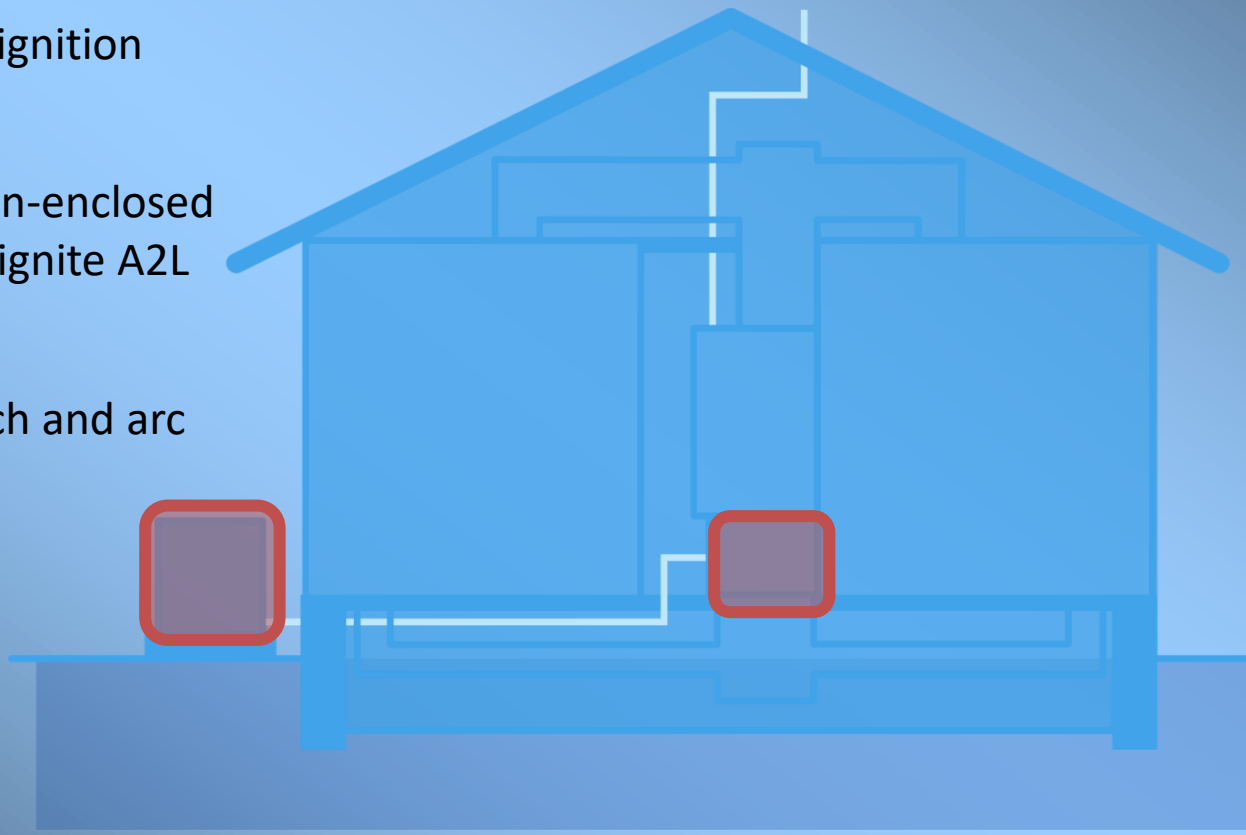


AGENCY REQUIREMENTS

Ignition Source Isolation

What agencies state that manufacturers must do:

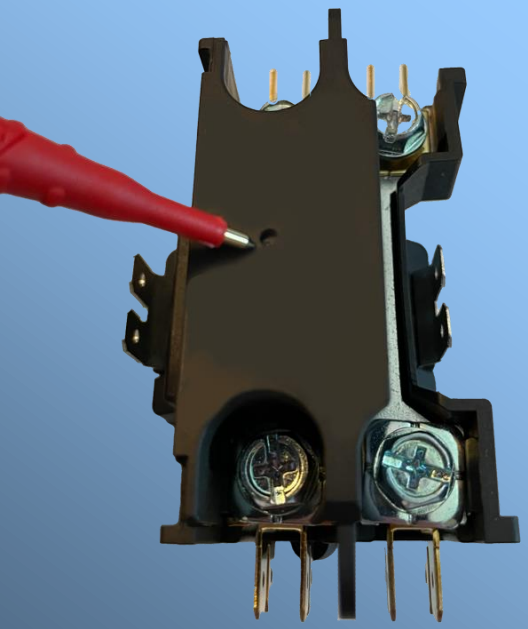
- Review and mitigate all ignition sources
- Identify and mitigate non-enclosed components that could ignite A2L refrigerant
- Protect wiring from pinch and arc



AGENCY REQUIREMENTS

Ignition Source Isolation

WHAT WE DID TO COMPLY:



Outdoor unit

- Compressor plug
  - Enclosed plugs provide necessary protection
- Electrical ignition points
  - Wire sleeves on compressor and crankcase heater wiring*
- Contactor
  - Patented top cover eliminates gap / small gap acts as flame arrestor
  - Manual operation still available
  - Minimal air gaps = flame arrestor

** Subject to change*

AGENCY REQUIREMENTS

Ignition Source Isolation

WHAT WE DID TO COMPLY:

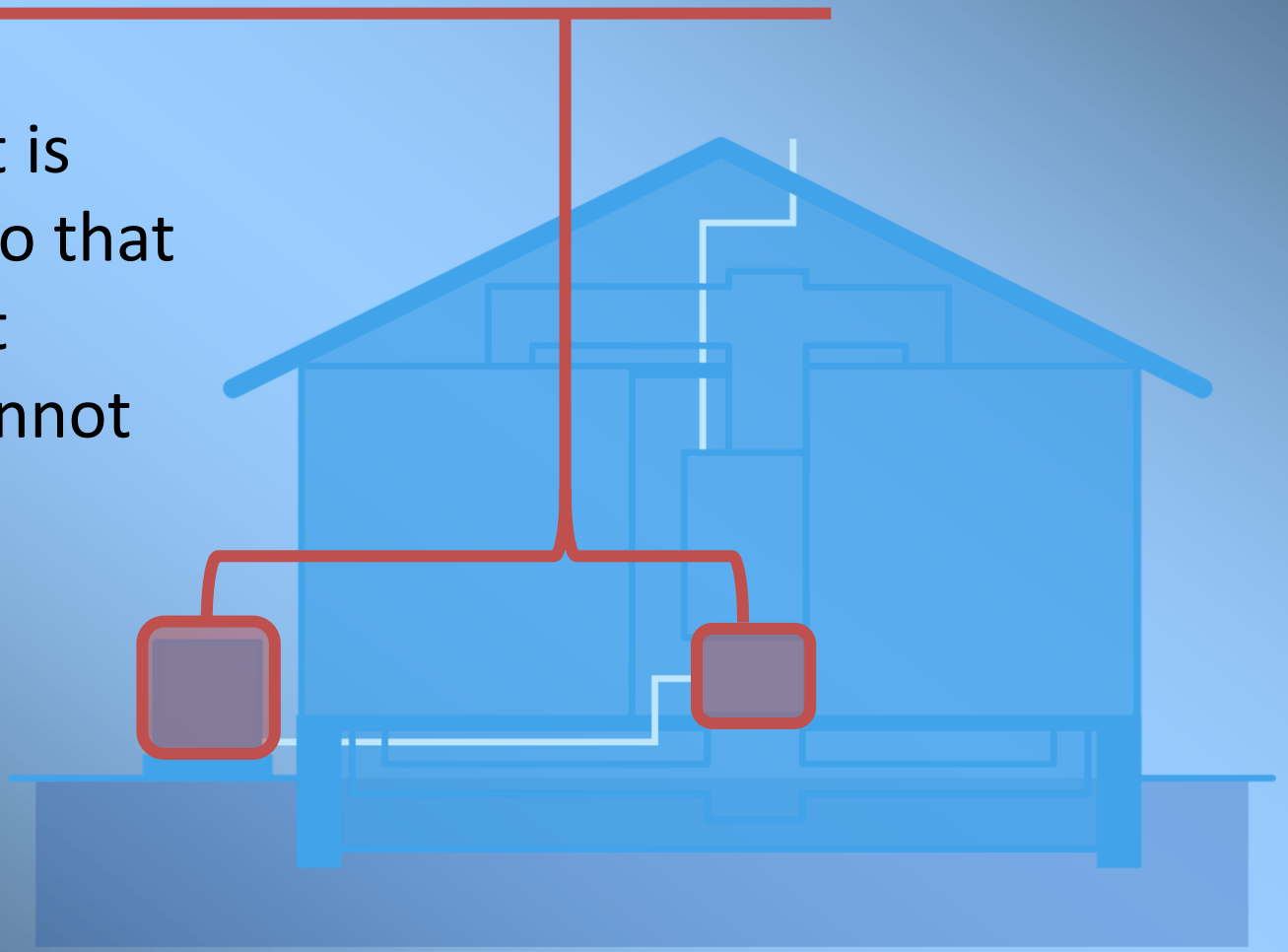
Outdoor unit

- Electrical ignition points
  - All potential ignition sources assessed at factory
  - Protection installed on wiring
  - Electric heaters on units are not an ignition source

AGENCY REQUIREMENTS

No Competent Ignition

Equipment is designed so that competent ignition cannot occur

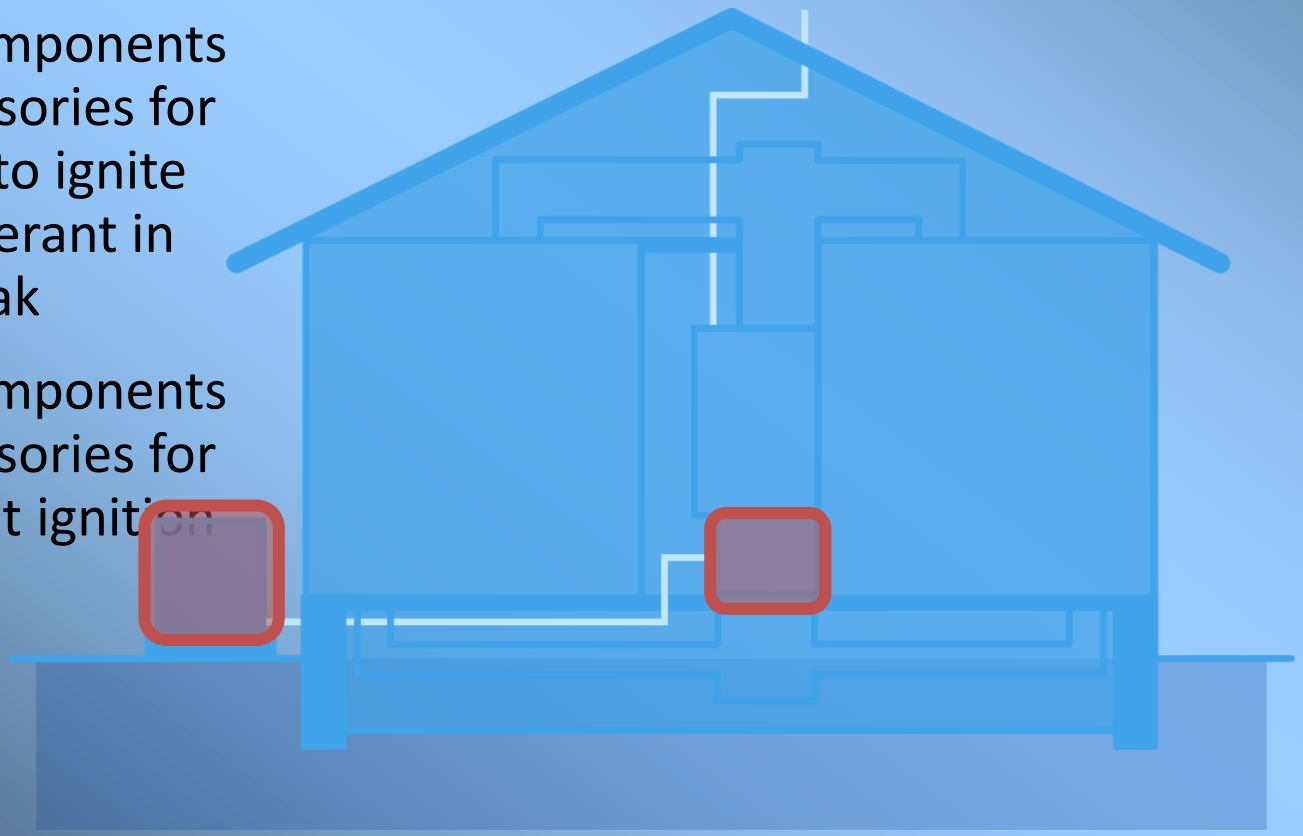


AGENCY REQUIREMENTS

No Competent Ignition

What agencies state that manufacturers must do:

- Assess components and accessories for potential to ignite A2L refrigerant in case of leak
- Assess components and accessories for competent ignition



AGENCY REQUIREMENTS

No Competent Ignition

WHAT WE DID TO COMPLY:

Some accessories we have reviewed for competent ignition for R454-B

		Voltage	FLA
Air Purifiers	Infinity Air Purifier	110	0.3
Humidifiers	HUMCRLFP	120	0.7
	HUMCRSTM	120 & 208/240	16.0
Dehumidifiers	DEHCRCDB1070	120	6.3
	DEHCRCDB1095	120	8.0
UVC Lamps	1LP	115	0.6
	2LP	115	1.1
	1LP	208/230	0.3
	2LP	208/230	0.6
Ventilators	FAVCRR6C2100-B01	22-30	2.0
	ERVCRSVB1100	120	1.0
	HRVCRSVB1100	120	0.9
	ERVCRLHB1200	120	2.1
	HRVCRLHB1150	120	1.5
	HRVCRLHB1250	120	2.1
	HRVCRSVU1157	120	1.0
	ERVCRNVA1090	120	1.3
	FSFXXAOA1180	120	0.7

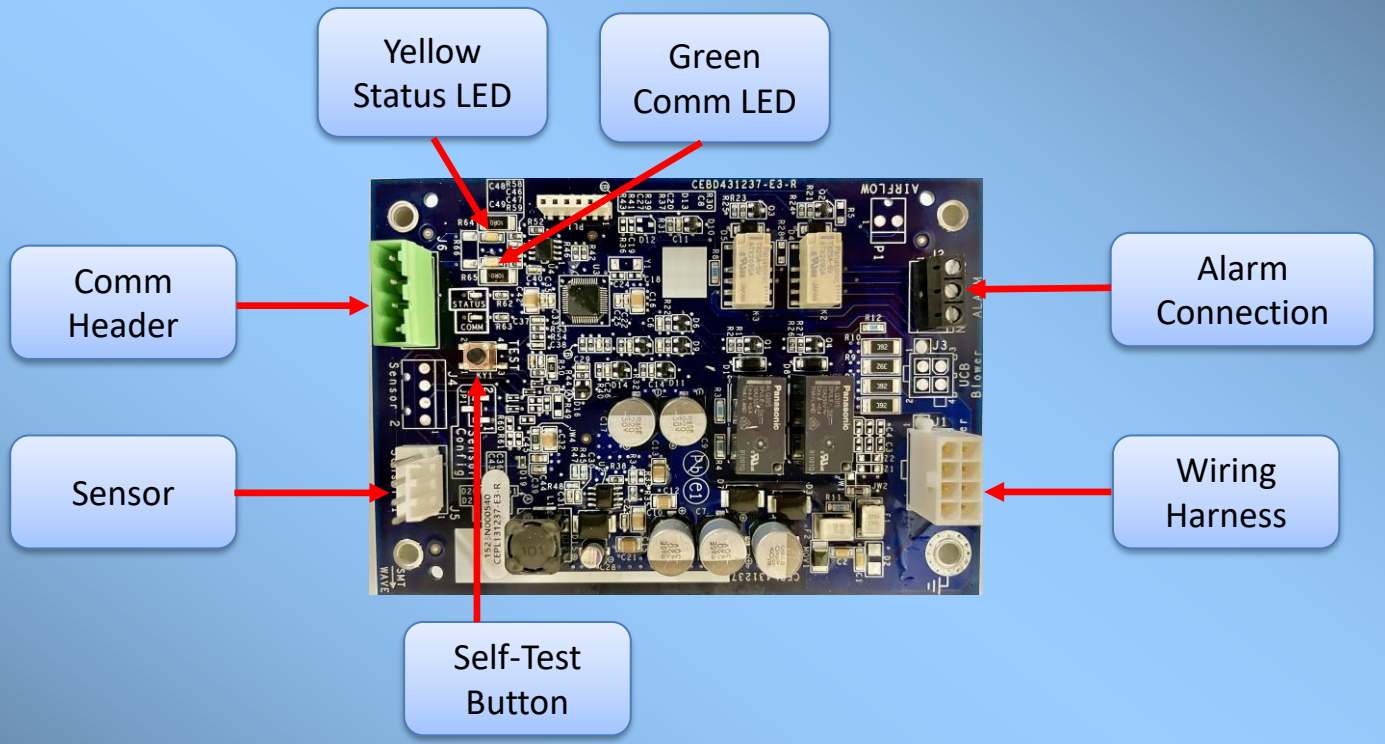
MITIGATION EQUIPMENT

Mitigation Board

- Mitigation Board
  - Power up – 10s sensor warm up delay
  - Self test button (60s mode)
  - Mitigation threshold 20% LFL (Lower Flammability Level)
  - Green LED indicates communication with wall control (communicating equipment)
  - Yellow status LED indicates communication with the sensor and flashes for mitigation mode / fault code

MITIGATION EQUIPMENT

Mitigation Board



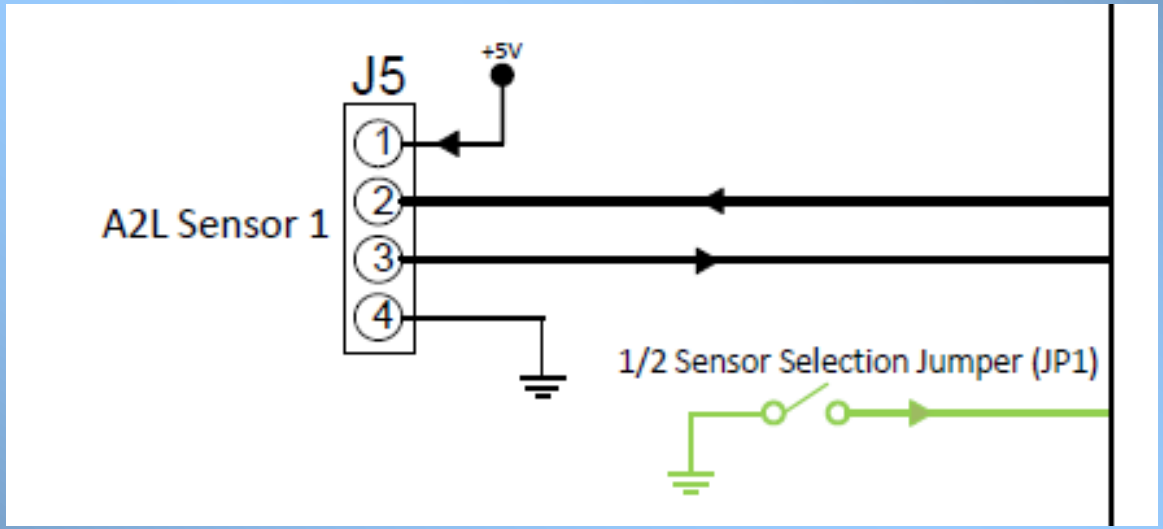
MITIGATION EQUIPMENT

Mitigation Board Fault Codes

Flash	Description	Wall Control Display
1	Mitigation in progress	Sensor 1 R454B Leak
2	Sensor 1 open	Sensor 1 Open
3	15min minimum Mitigation or 5min blower off delay	Mitigation off delay
4	0 VAC sensed on G output	Blower output not operating
5	Fault with A2L digital sensor	Sensor 1 fault (Heat allowed after 10min)
6	Self-test button stuck (more than 30sec)	Test button stuck
7	Y out switched with Y in or W out switched with w in	Y or W wiring inverted
8	Y or W shorted	Y or W output shorted to Y or W input

MITIGATION EQUIPMENT

Mitigation Sensor



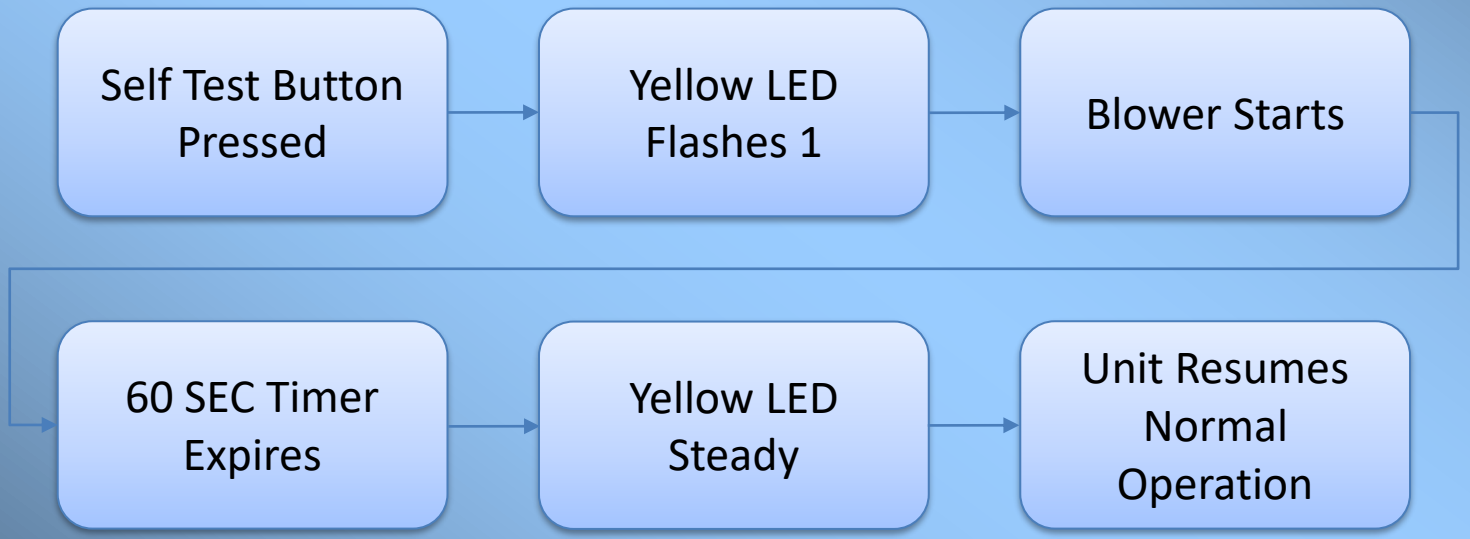
MITIGATION EQUIPMENT

Mitigation Sensor

- A2L Sensor Testing
  - Power up with sensor connected – Wait for 10s sensor warm up delay
  - Ensure the Yellow status LED is on steady (no flashes)
    - Shows the sensor is communicating
  - Disconnect the sensor from the Mitigation board
  - Verify that within 5sec the relays click and the yellow status LED begins flashing 2
    - This shows sensor is no longer communicating

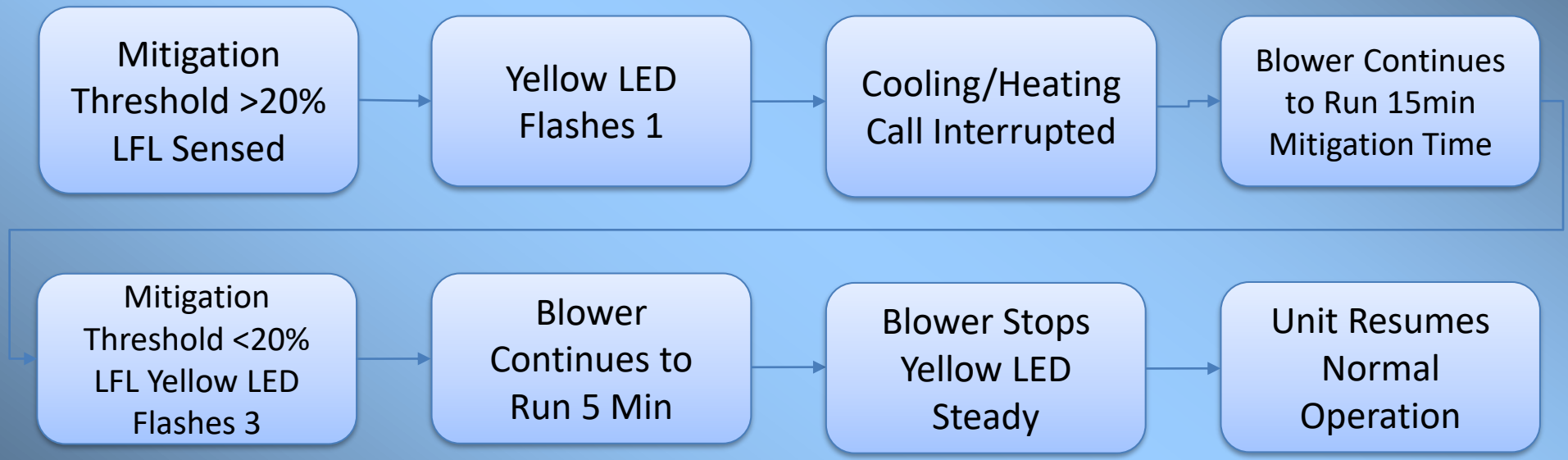
MITIGATION OPERATION

Self Test



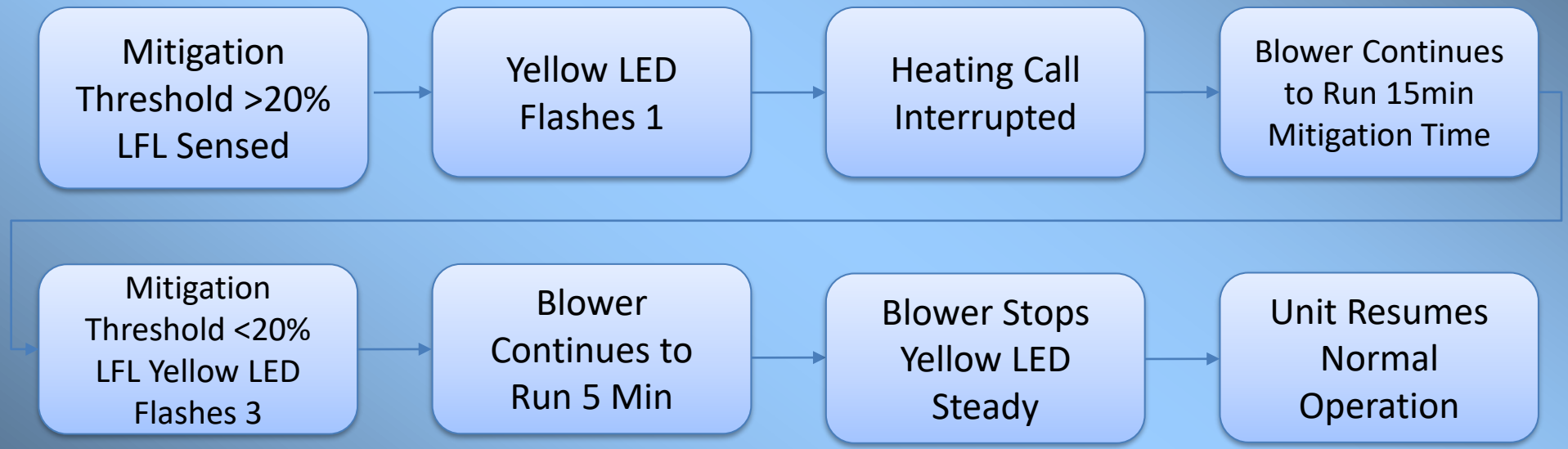
MITIGATION OPERATION

Cooling and Heat Pump Heating



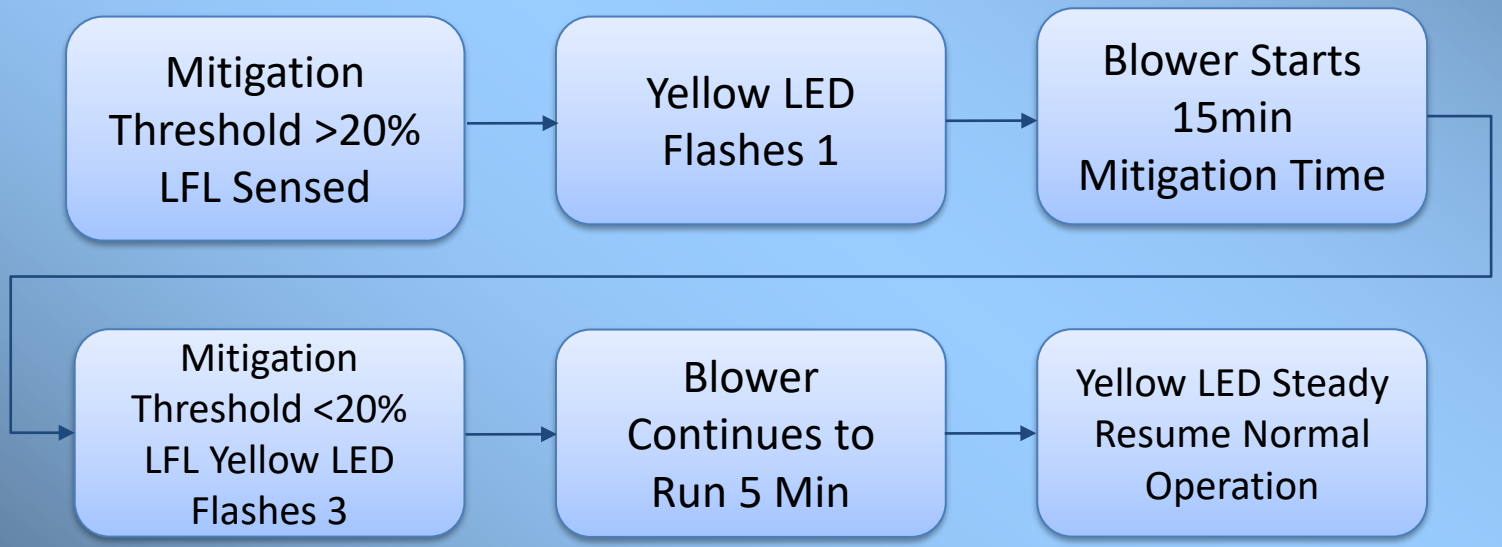
MITIGATION OPERATION

Furnace Heating

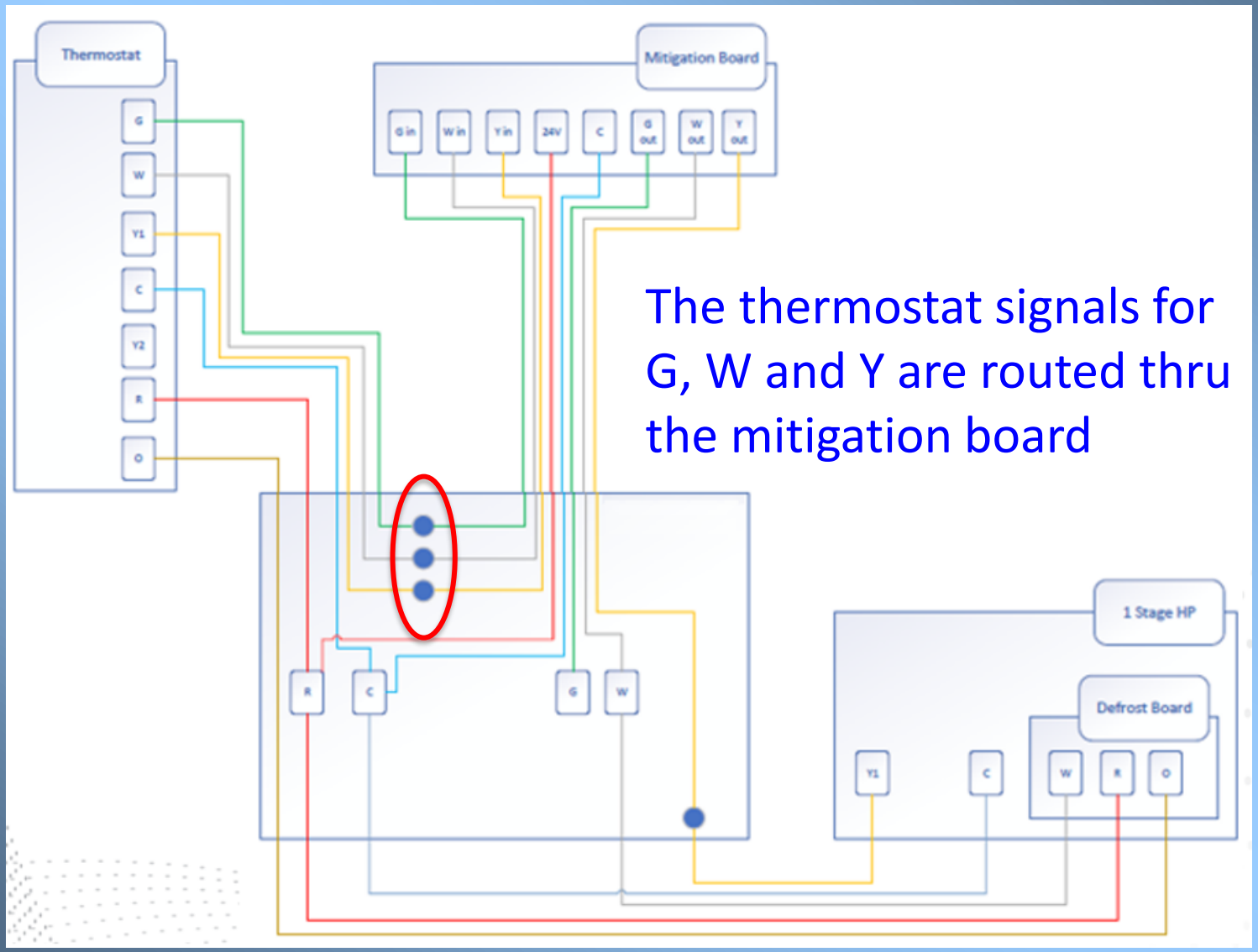


MITIGATION OPERATION

Stand-by No Call for Heating or Cooling



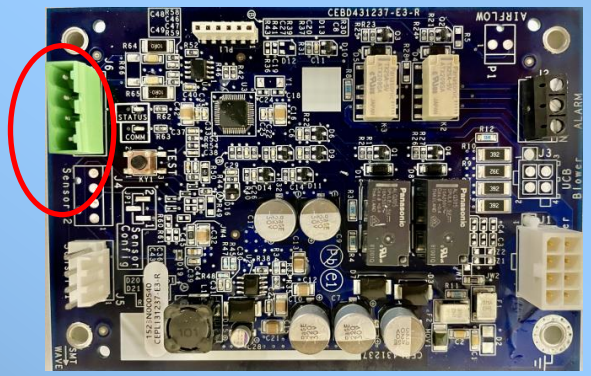
MITIGATION BOARD WIRING



MITIGATION BOARD COMMUNICATION

Mitigation Board is Communicating for Deluxe Models

- J12 ABCD header will be used
- Function remains the same



MITIGATION BOARD COMMUNICATION

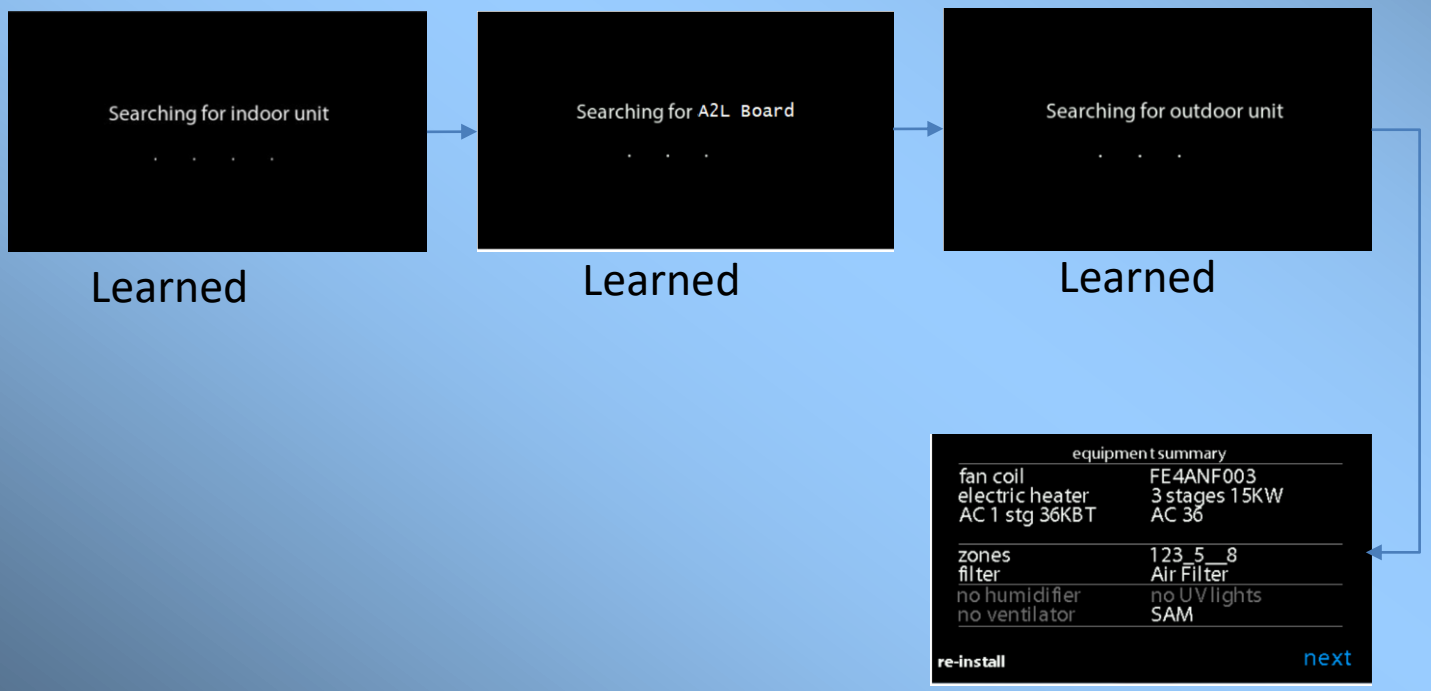
Mitigation Board is Communicating for Deluxe Models

- Mitigation board will be discovered by the wall control during Installation process

- Puron Advance™ outdoor equipment will not be allowed without the mitigation board present

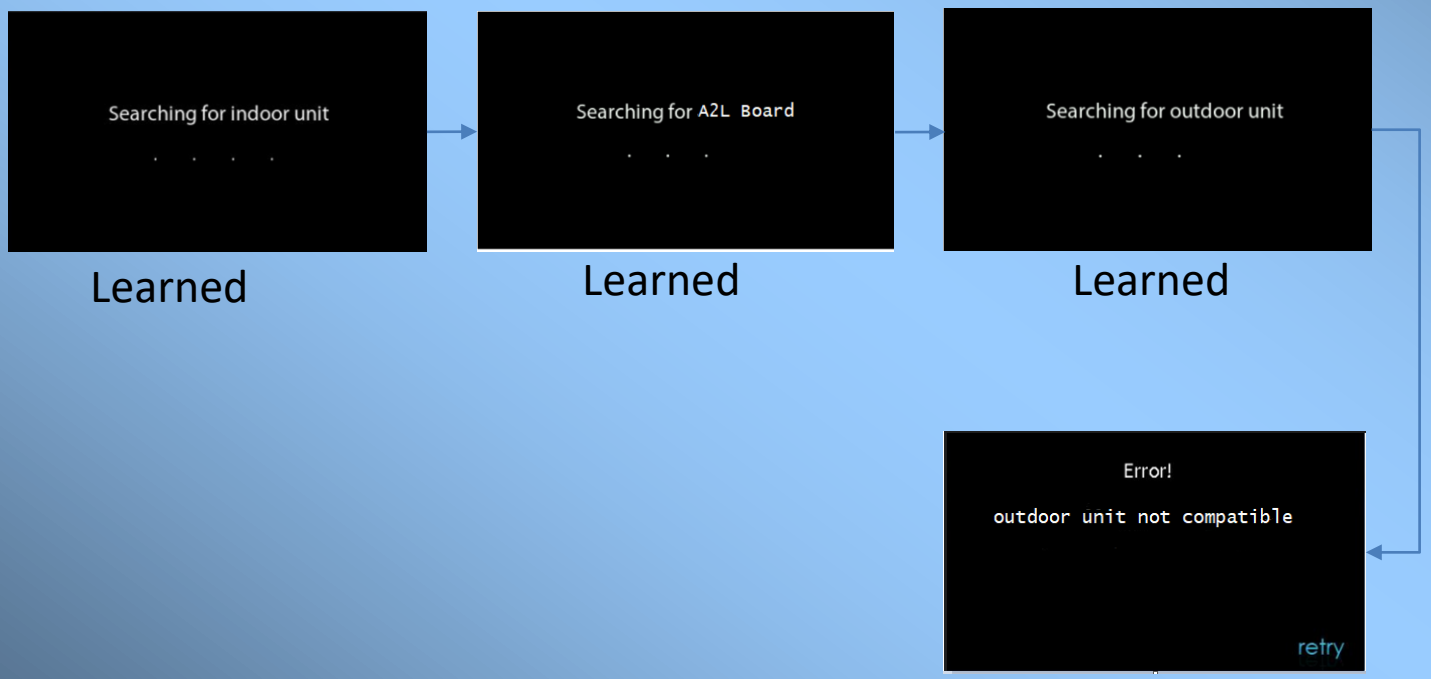
MITIGATION BOARD COMMUNICATION

Wall Control Installation Process - Compatible



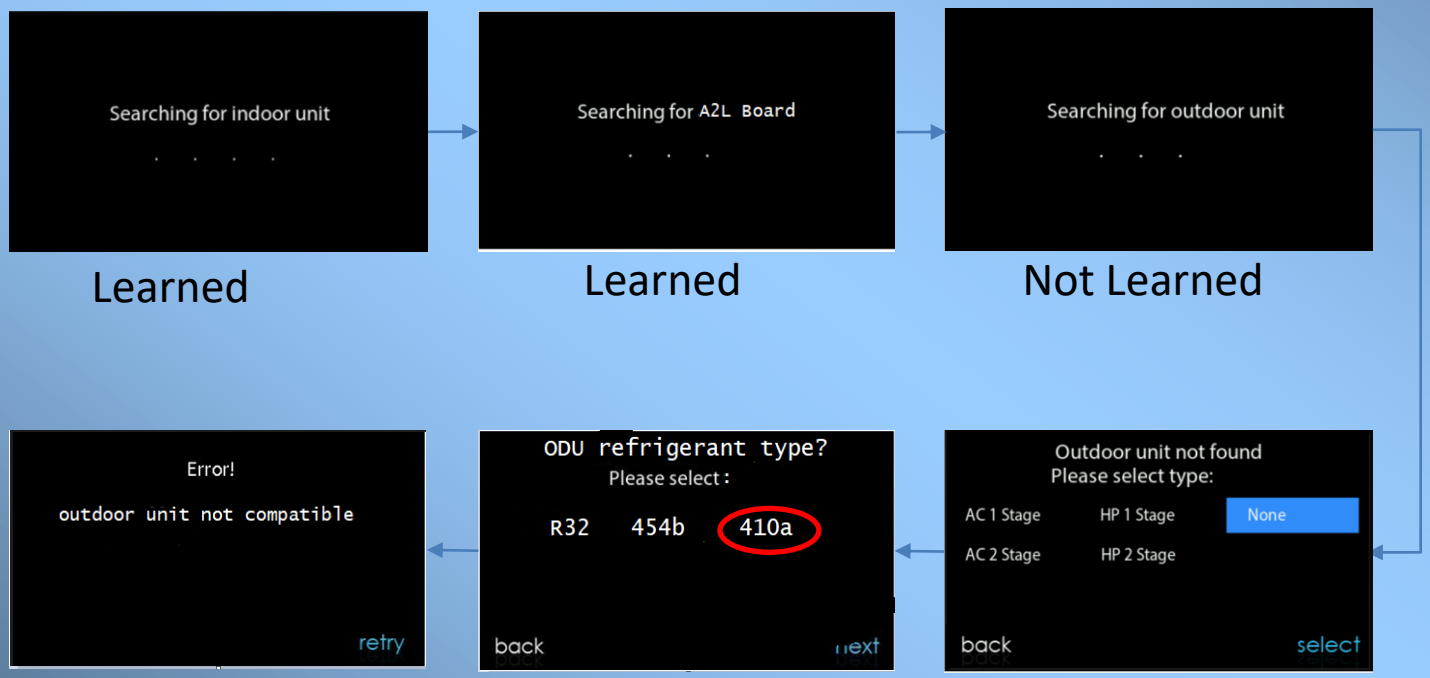
MITIGATION BOARD COMMUNICATION

Wall Control Installation Process – Non-Compatible ODU



MITIGATION BOARD COMMUNICATION

Wall Control Installation Process – Non-Compatible ODU




QUESTIONS

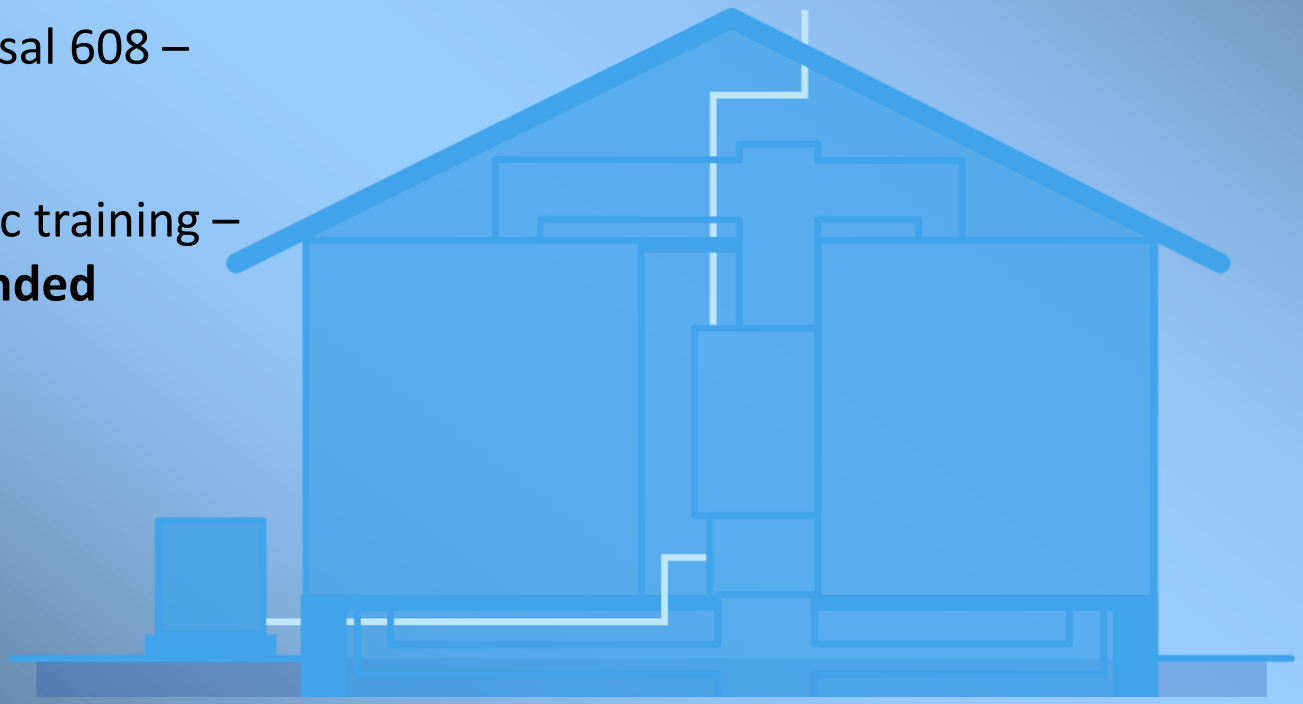
A2L Refrigerants: Safety, Storage, & Transportation

AGENCY REQUIREMENTS

Service Training

What agencies state that manufacturers must do:

- EPA Universal 608 – **Required**
- A2L-specific training – **Recommended**



Cylinder Requirements

Cylinders for A2L Refrigerants

Color

- A1: Light green gray
- A2L: Light green gray with red top
- Type of refrigerant is marked on cylinder and/or tag

Cylinder Requirements

Threads (connections)

- A1: RH thread
- A2L: LH thread

AGENCY REQUIREMENTS

Cylinder Requirements

AGENCY REQUIREMENTS

Cylinder Requirements

Flammable

- Potentially flammable contents

Compressed Gas

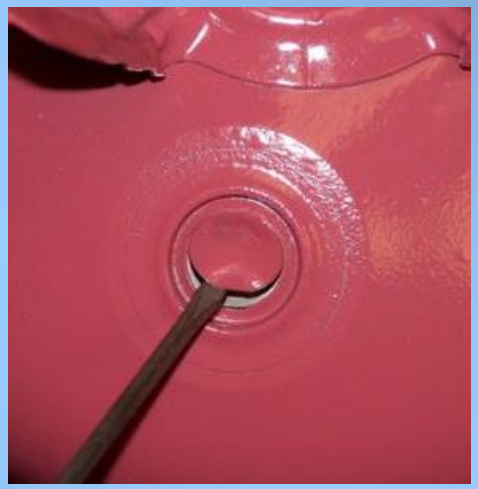
- High pressure gas that could explode when heated

AGENCY REQUIREMENTS

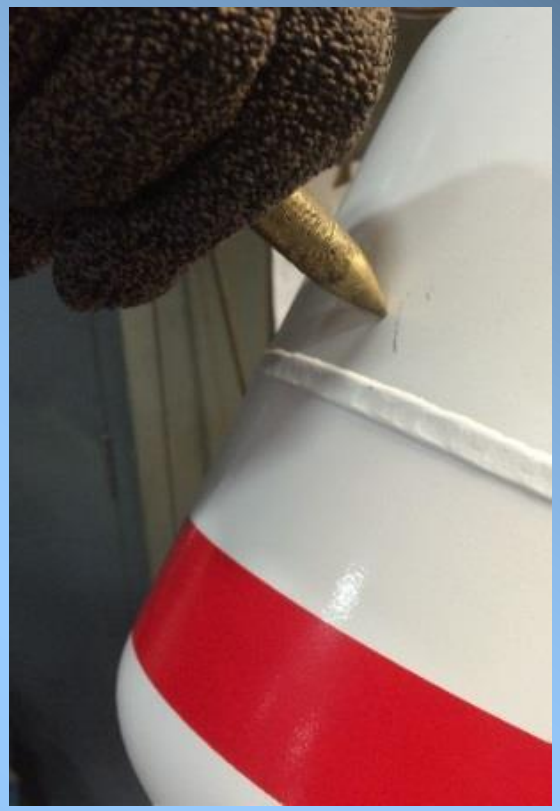
Cylinder Requirements

Cylinder end of life handling

- A1: Remove or puncture rupture disc



- A2L: Puncture side of cylinder



Source: https://www.ahrinet.org/sites/default/files/2022-11/AHRI_Guideline_Q_2016.pdf

Cylinder Requirements

Recovery cylinders

- Yellow Top – A1
- Yellow top with Red band – A2L

SAFE TRANSPORTATION

How are cylinders of A2L refrigerants stored and <u>transported</u> safely?

AGENCY REQUIREMENTS

HAZMAT protocols not needed if ≤ 26.4 lbs (12 kg) of finished goods containing A2L refrigerant

- Per US DOT
- No limit to number of A2L cylinders that can be transported

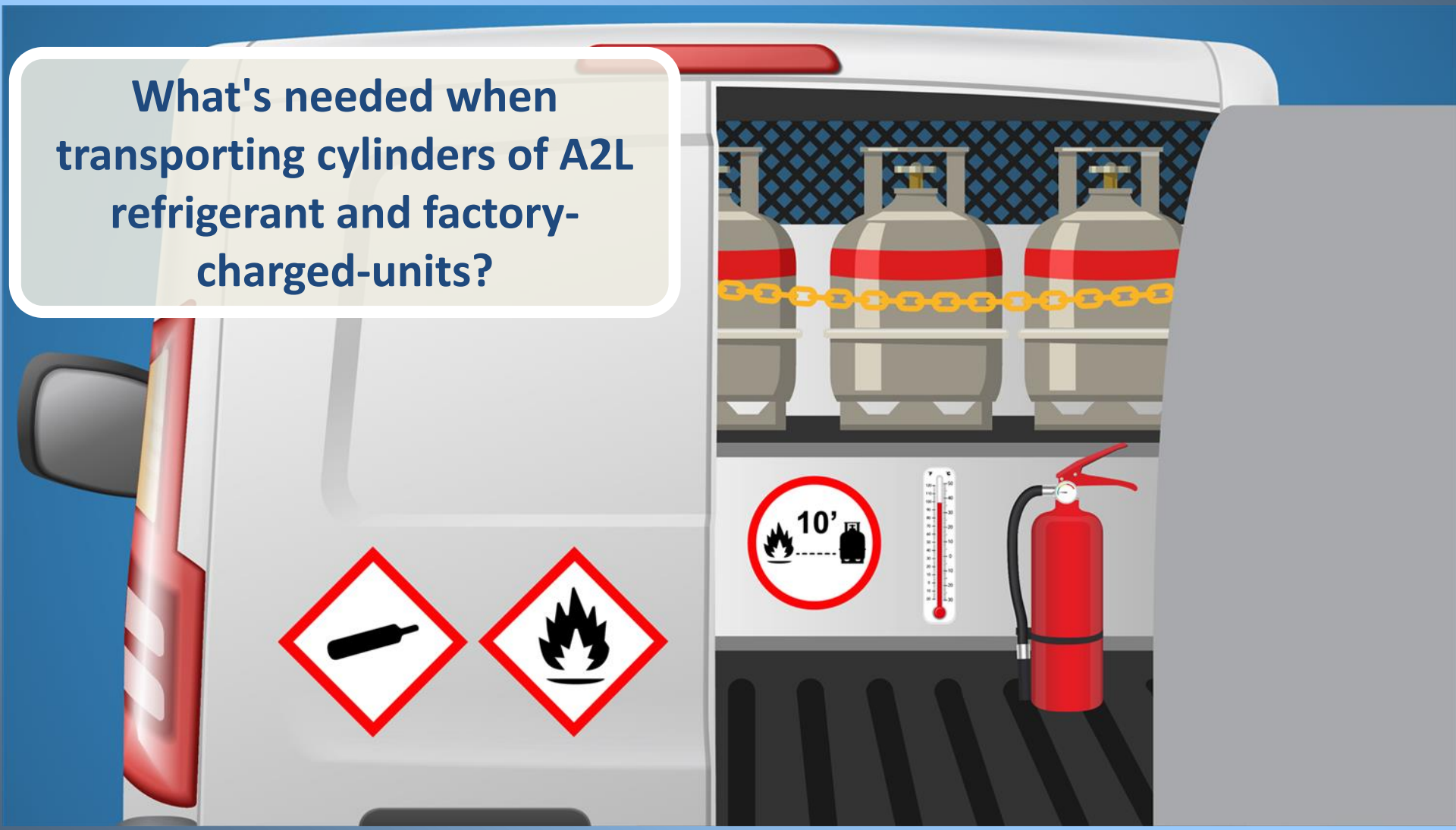
SAFE TRANSPORTATION

You already transport flammable gasses:

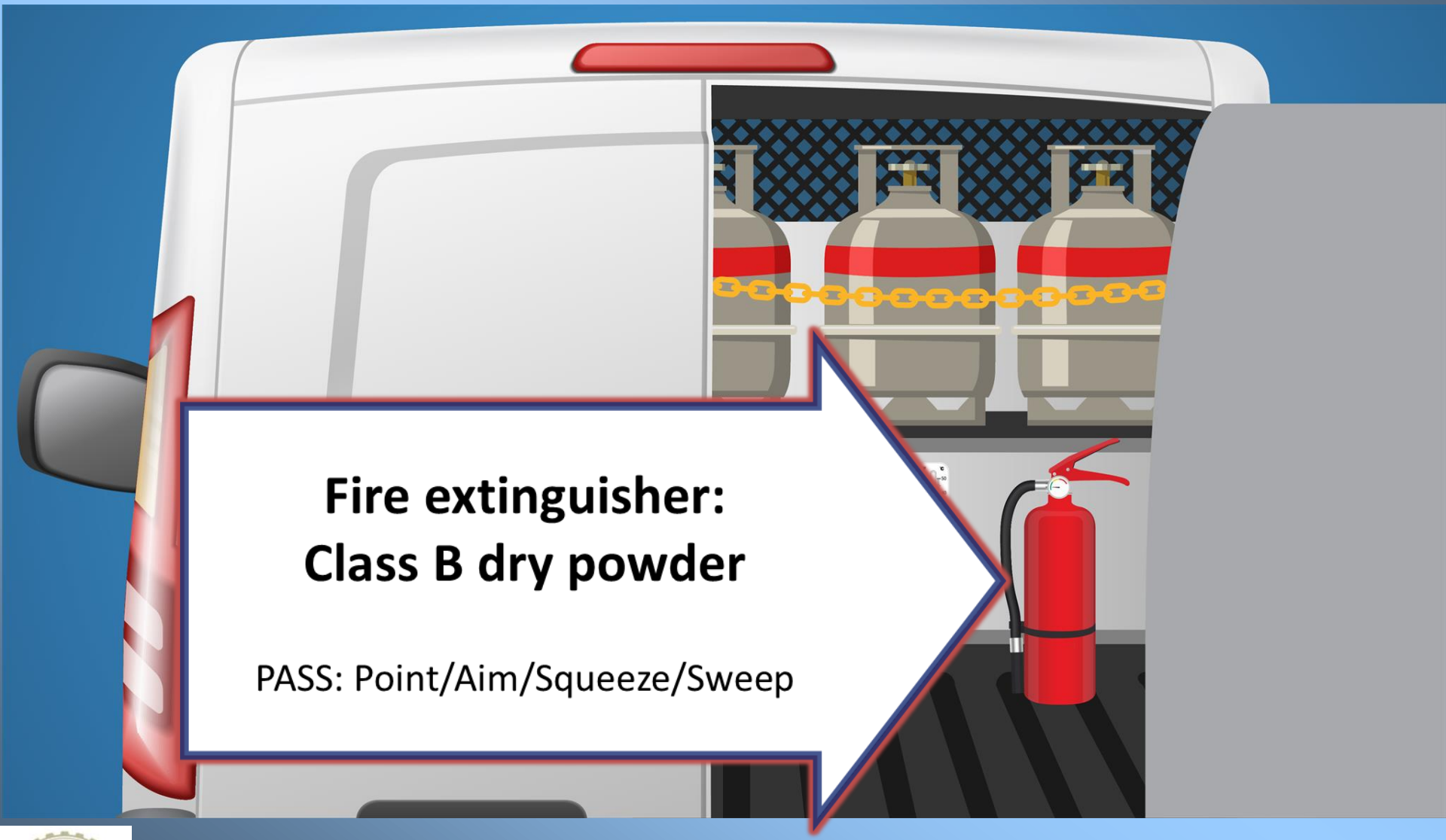
- **<u>oxygen</u>**
- **<u>acetylene</u>**

SAFE TRANSPORTATION

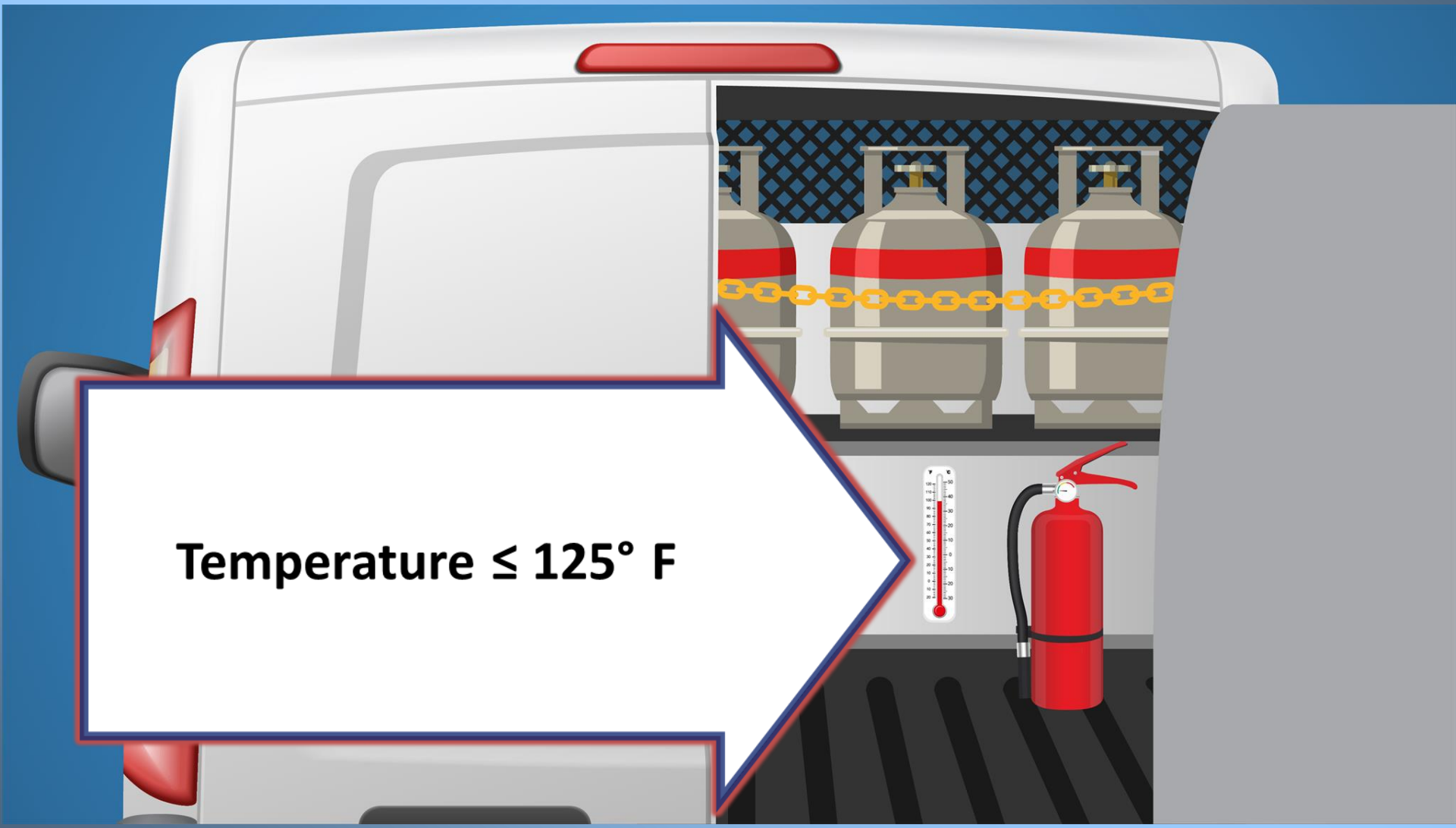
What's needed when transporting cylinders of A2L refrigerant and factory-charged-units?



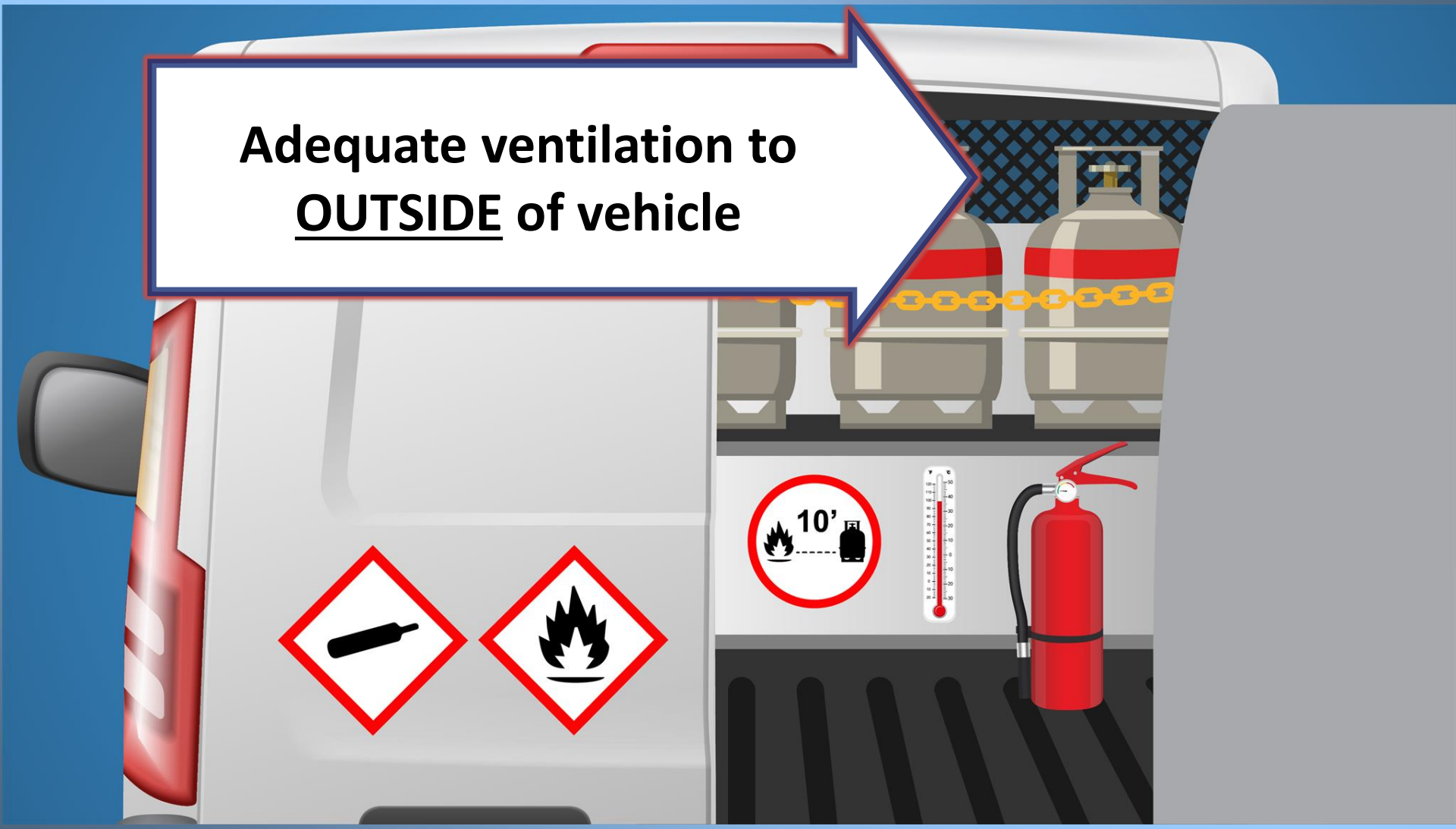
SAFE TRANSPORTATION



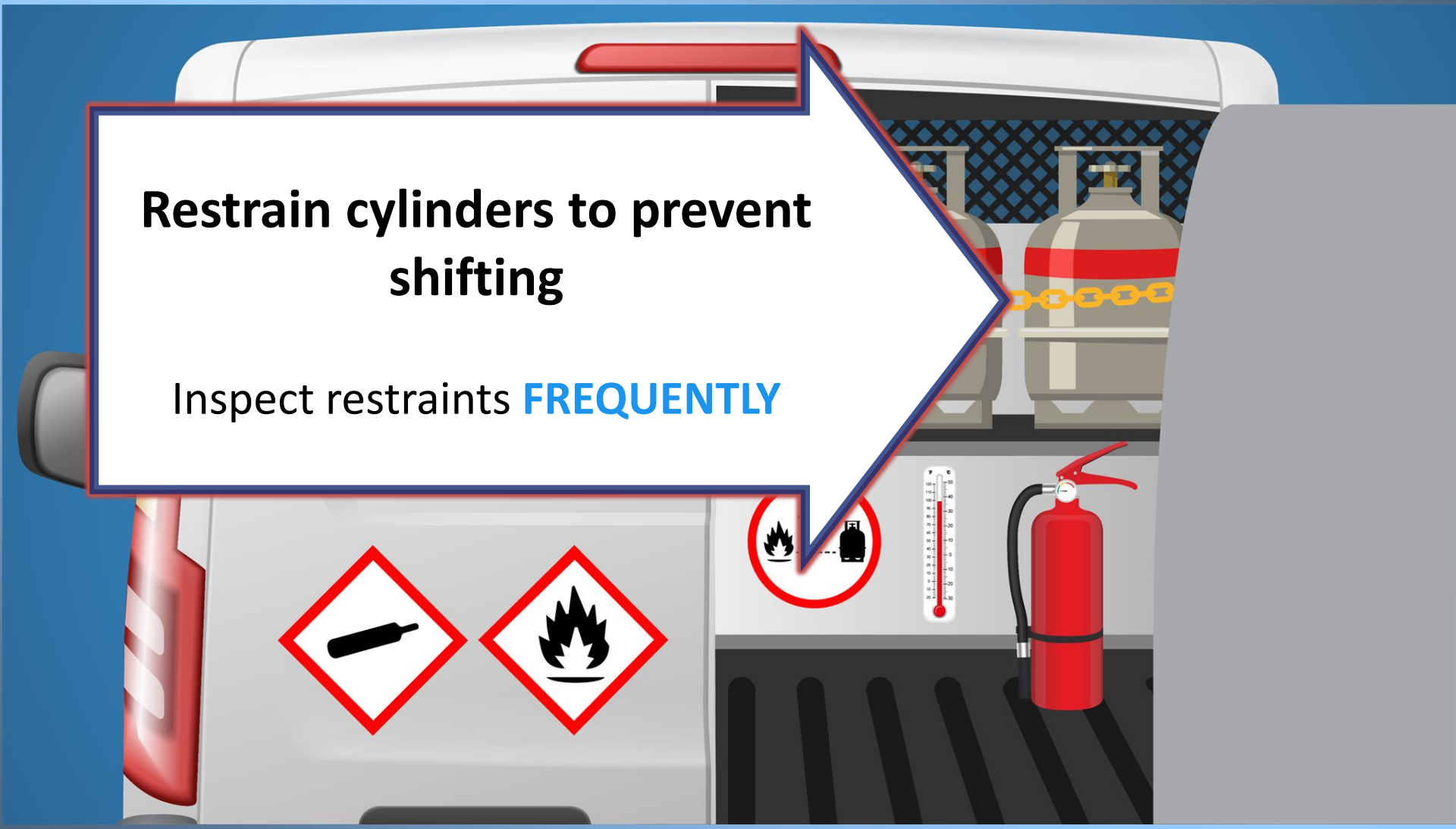
SAFE TRANSPORTATION



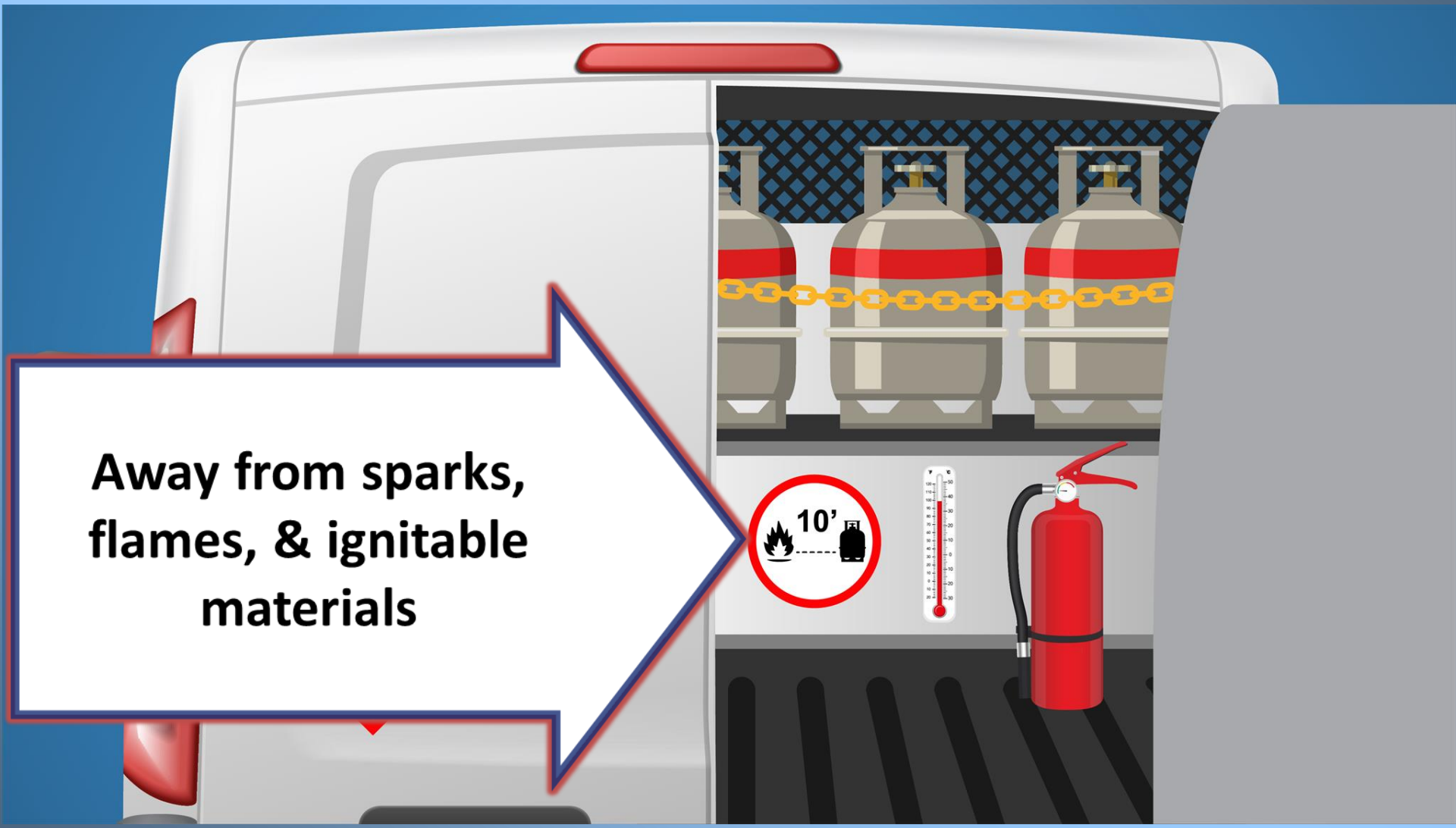
SAFE TRANSPORTATION



SAFE TRANSPORTATION



SAFE TRANSPORTATION



WORKSITE SAFETY

Staying safe at the jobsite:

- Logistics
- Same/different service items & tools
- Same/different field service processes

Installation considerations

- A2L not a “drop-in” refrigerant
- Systems & equipment must be designed for R454-B

WORKSITE SAFETY

Safety considerations to be aware of when installing & servicing equipment with A2L refrigerants

WORKSITE SAFETY

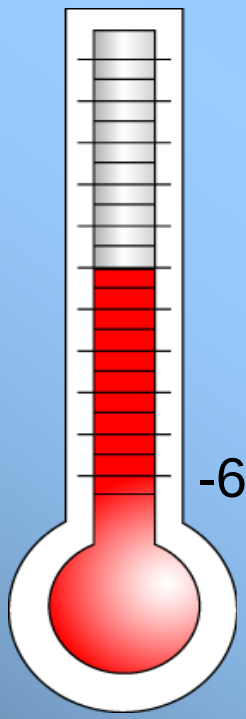
Fire risk SLIGHTLY HIGHER with A2L than with A1

- Fire extinguisher (type) must suppress chemical fires

WORKSITE SAFETY

WEAR proper PPE

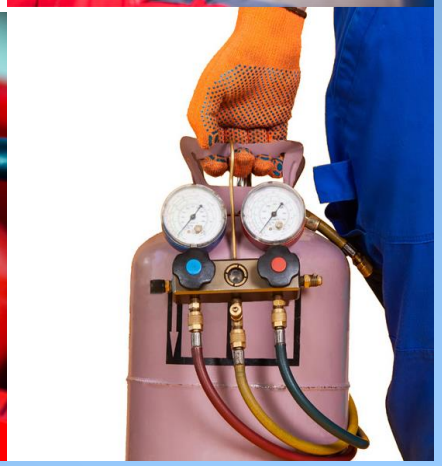
WORKSITE SAFETY



Water	R718	212° F
HFC-134a		-15° F
HCFC-22		-41° F
HFC-410A		-62° F
R454B		Close to 410A

WORKSITE SAFETY

- ✓ Common sense
- ✓ Basic safety principles



SERVICE EQUIPMENT AND TOOLS

- Inspect service tools & equipment for compatibility
- Verify compatibility with manufacturers or AHRI

  www.ahrinet.org/saferefrigerant

SERVICE EQUIPMENT AND TOOLS

Gauge manifold & charging hoses

- Dedicated set for R454-B prevents cross-contamination

Service Item (versus R410A)	R454b
Gauge Manifold	No Changes
Charging Hoses	No Changes

Remember, cylinders for A2L refrigerants like R454-B have a left-handed thread, so adapters will be needed.

SERVICE EQUIPMENT AND TOOLS

Refrigerant leak detector

Service Item (versus R410A)	R454b
Refrigerant Leak Detector	Move to A2L Compatible

- A2L refrigerants have no stenching agents
- Ventilation and air circulation are required
- Use of a leak detector as a personal alarm is strongly recommended
- Ensure leak detector is approved for R454-B

R454B is an HFO refrigerant

SERVICE EQUIPMENT AND TOOLS

Electrical hand tools

Service Item (versus R410A)	R454b
Electrical Hand Tools	Non-sparking available (AHRI-8017)

- Spark-proof
- Check with tool manufacturer

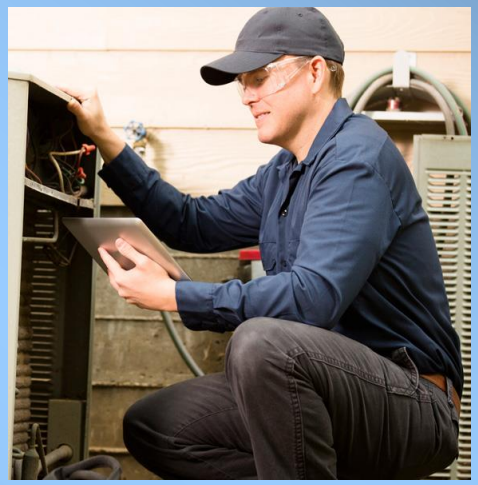
SERVICE EQUIPMENT AND TOOLS

Service Item (versus R410A)	R454b
Gauge Manifold	No Changes
Charging Hoses	No Changes
Refrigerant Leak Detector	Move to A2L Compatible
Electrical Hand Tools	Non-sparking available (AHRI-8017)
Ventilation Fan	Similar (May be differences in machine rooms)
Dry Chemical/CO_2 Fire Extinguisher	Chemical Compatible
Scales	No Changes
Gas Detector	Move to A2L Compatible
Vacuum Pump	Check with Manufacturer
Recovery Machine	Move to A2L Compatible
Refrigerant Recovery Cylinder	Flammable (GHS label; left-handed threads)

If unsure, check the AHRI website or contact the manufacturer

FIELD SERVICE PROCEEDURES

How does R454-B impact install & service tasks?



FIELD SERVICE PROCEEDURES

Requirement	R410a	R454b
Remove refrigerant safely following local & national codes	Required	Required
Purge circuit with inert gas (nitrogen)	**Best Practice**	
Evacuate	**Best Practice**	
Purge with inert gas for 5 min.	**Best Practice**	
Evacuate again	**Best Practice**	
Open the circuit by cutting or brazing	Final Step	Final Step
For repairs, purge with nitrogen during brazing	Required	Required
Pressure test	**Best Practice**	
Leak test	**Best Practice**	
Evacuate system again after service	Required	Required
Charge system	Required	Required

With the new refrigerant ... Best practice? Required? Optional?

FIELD SERVICE PROCEEDURES

Requirement	R410a	R454b
Remove refrigerant safely following local & national codes	Required	Required
Purge circuit with inert gas (nitrogen)	Best Practice	**Required**
Evacuate	Best Practice	**Required**
Purge with inert gas for 5 min.	Best Practice	**Required**
Evacuate again	Best Practice	**Required**
Open the circuit by cutting or brazing	Final Step	Final Step
For repairs, purge with nitrogen during brazing	Required	Required
Pressure test	Best Practice	**Required**
Leak test	Best Practice	**Required**
Evacuate system again after service	Required	Required
Charge system	Required	Required

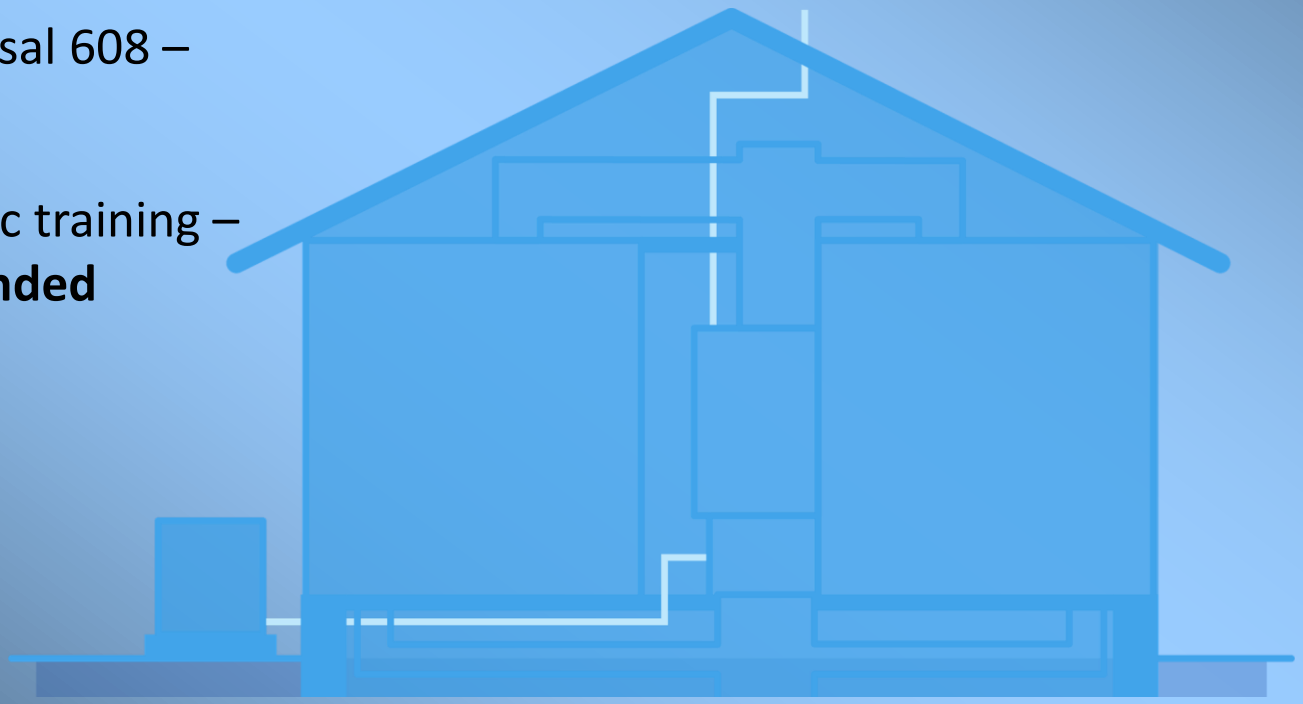
Ensure ALL refrigerant is out of the system prior to opening for repair or replacement service

FIELD SERVICE PROCEEDURES

Always refer to the installation manual for procedures that may have changed with R454-B

FIELD SERVICE PROCEEDURES

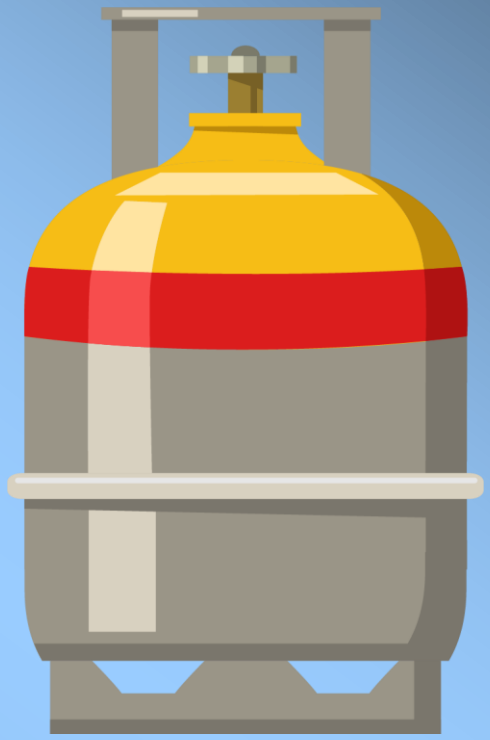
- EPA Universal 608 – **Required**
- A2L-specific training – **Recommended**

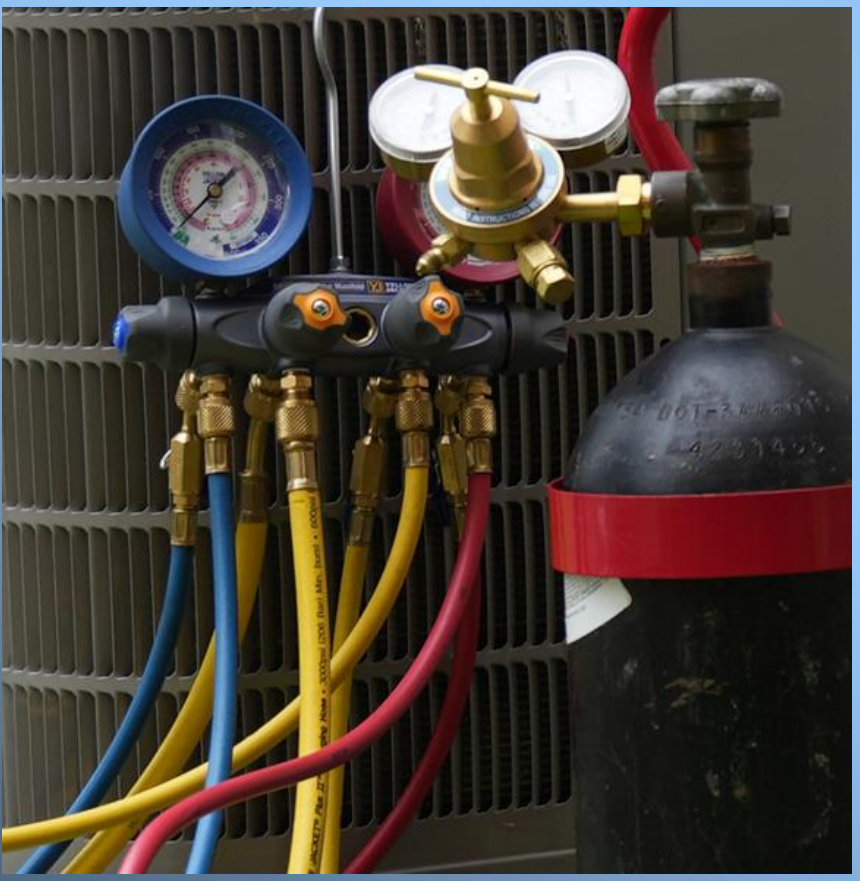


FIELD SERVICE PROCEEDURES

Recovery

- Always recover refrigerants into an approved container
- Clearly mark the container for refrigerant type
- Never mix refrigerant types





Inert gas purge

- Sweep system with inert gas to help release any trapped refrigerant
- What changed with R454-B inert gas purge?
  - Previously best practice – now required with R454-B
  - Additional inert gas purge required after 1st evacuation to ensure trapped refrigerant can be pulled out

Equipment containing flammable refrigerants

Brazing – Existing Equipment Repair or Replacement

When brazing a system that has been charged with a flammable refrigerant, the system charge must be recovered first.

The system must be swept twice with nitrogen to ensure that there is no residual refrigerant.

A low-pressure nitrogen purge must be done during the brazing process

Verify the work area is free of any flammable gases using a refrigerant leak detector.

Keep a fire extinguisher near by.

FIELD SERVICE PROCEEDURES

Charging

- NEVER exceed maximum allowable charge weight
- Always charge as liquid
- Never mix refrigerants
- Always charge by subcool/weight
- Weigh in charge during winter as necessary

FIELD SERVICE PROCEEDURES

- Tracking and Verification of Total Unit Charge

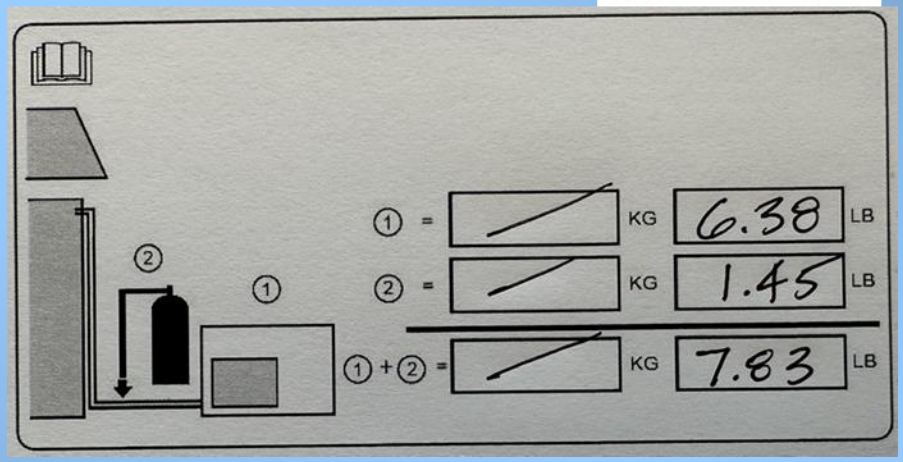
✓Charging Label

- ✓ Documents how much refrigerant a system contains
- ✓ Completed by installing technician

1 = Unit Charge

2 = Additional Charge For The Line Set Beyond 15ft

3 = (1+2) = Total Charge



SUMMARY

Safe application of A2L refrigerants in residential systems:

- Refrigerant charge limit
- Minimum area check (Amin)
- Active mitigation for leaks
- Factory installed leak detection
- Ignition source isolation
- No competent ignition
- Labels
- Literature
- Piping
- Service training

SUMMARY

Cylinder Requirements

Flammable

- Potentially flammable contents

Compressed Gas

- High pressure gas that could explode when heated

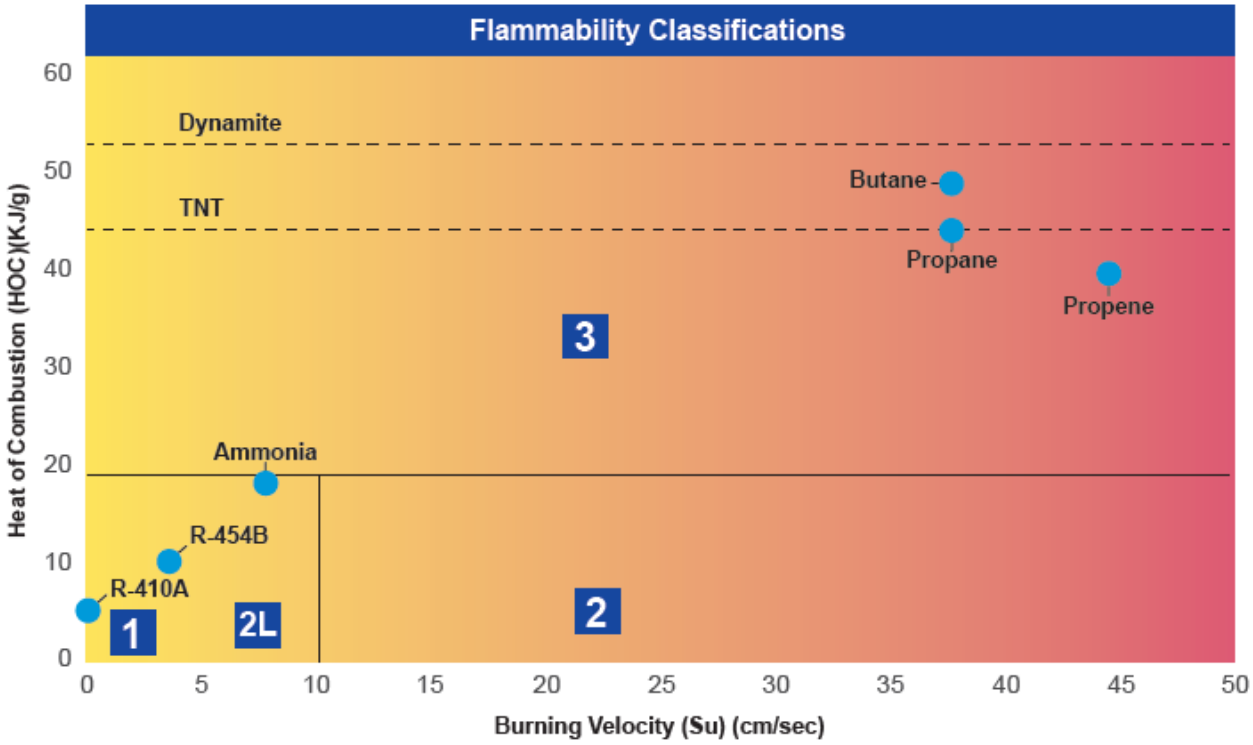
A2L	R-454B, R-32, R-454A, R-455A	"Mildly Flammable" Difficult to Ignite Relatively Low Energy Release Low Flame Speed

SUMMARY

What About Flammability?

ASHRAE Classifications A1 vs. A2L vs. A3

As previously touched on, the main apprehension for Puron Advance is its "mildly flammable" classification. We get it. Nobody wants to think their new HVAC system is going to be a potential hazard. But the fact of the matter is, Puron Advance falls into a new ASHRAE classification: A2L, or mildly flammable. It is important to note that, R-32 (used by some competitors) also falls into this category as well, and neither poses significant risk for installers, service technicians or homeowners.



COMPARING CLASSIFICATIONS

Looking at the chart, you'll see how Puron Advance compares to previous refrigerants and other, more flammable gases:

SUMMARY

A2L refrigerant cylinders:

- Red top
- Left-handed thread
- Pressure relief valve
- Flammable and Compressed Gas labels

Warehouse safety:

- Adhere to MAQs
- Ensure required documentation & signage

Transport safety:

- Cylinders secured
- Outside ventilation

Worksite safety & best practices:

- Dedicated gauges & hoses
- Refrigerant leak detector for personal protection
- Electronic tools must be spark-proof
- Verify tools and equipment are safe for R454-B

SUMMARY

Why is Carrier switching to a refrigerant that falls in the A2L classification – which makes it mildly more flammable than Puron?

In order to meet the new requirement a low GWP refrigerant, that also maintains no ozone depletion, the industry as a whole had to move to this new A2L classification.

40° R410A=118 PSIG

40° R454B= 107 PSIG

120°F R410A =430 PSIG

120°F R454B= 396 PSIG

At what pressures will the Puron Advance coils operate?

The pressures and temperatures of Puron Advance coils will operate similarly to Puron. The pressure for Puron Advance will be roughly 7% less than current Puron products. This has allowed us to utilize the same coils with changes to the TXV and dissipation system being the only necessary changes for performance.

Does this refrigerant contain propane?

No. There is absolutely zero propane gas in the new Puron Advance refrigerant.

Is Puron Advance more efficient than Puron?

Puron Advance is a near drop-in in terms of performance compared to Puron, with very similar temperatures and pressures. While creating a better planet for tomorrow, Puron Advance systems will achieve similar efficiency across the board.

SUMMARY

Top ~~10~~ 11 Things to Remember About Puron Advance

1. Puron Advance is Carrier's choice to replace Puron and to meet the new EPA requirements for a low GWP and zero ozone depletion refrigerant.
2. Puron Advance will be used on all Carrier residential ducted and ductless products and our light commercial products.
3. Puron Advance offers similar operating temperatures, pressures, and oil compatibility to Puron – but delivers a GWP of 466 which is a 75% reduction in GWP vs. Puron.
4. Puron Advance falls into a new ASHRAE class of refrigerants called A2L – which are only mildly more flammable than A1 refrigerants, and which are less flammable than many common substances found in homes such as rubbing alcohol or nail polish remover.

SUMMARY

5 At launch, ALL new Carrier products with Puron Advance will include a factory-installed leak dissipation system to meet new UL requirements.

6 The new mitigation control boards can be wired into any existing furnace and thermostat when installing a new Puron Advance outdoor unit AND evaporator coil.

7 All Puron Advance products – including all components and accessories within – have been assessed to ensure no ignition source providing you with the extra confidence around our built-in safety measures.

8 Many of the field service procedures that are now required with Puron Advance were already best practices – so your process should not need to change at all.

SUMMARY

9 Cylinders containing Puron Advance will have obvious differences – such as different colors, left-handed threads, and pressure relief valves to name a few – to avoid any confusion in the field.

10 Puron Advance allows the highest overall refrigerant supply through the refrigerant emissions supply phasedown – which means less change for you.

11 Carrier Global Corporation's residential products switching to Puron Advance is like avoiding the greenhouse gas emissions from over 5 million gas-powered passenger vehicles for one year.* That's a big impact!

SUMMARY

On January 1, 2025, R-410A will no longer be allowed in newly manufactured residential and rooftop light commercial HVAC products.
The requirement is to use refrigerants lower than 700 GWP.

It is important to reiterate that as of January 1, 2025, HVAC equipment manufacturers will not be allowed to build equipment using the current R-410A refrigerant.
The draft of the ruling proposes a one-year sell-through meaning that all equipment built before 2025 with R-410 must be installed before January 1, 2026.*

SUMMARY

Puron Advance® (R-454B) Product Availability

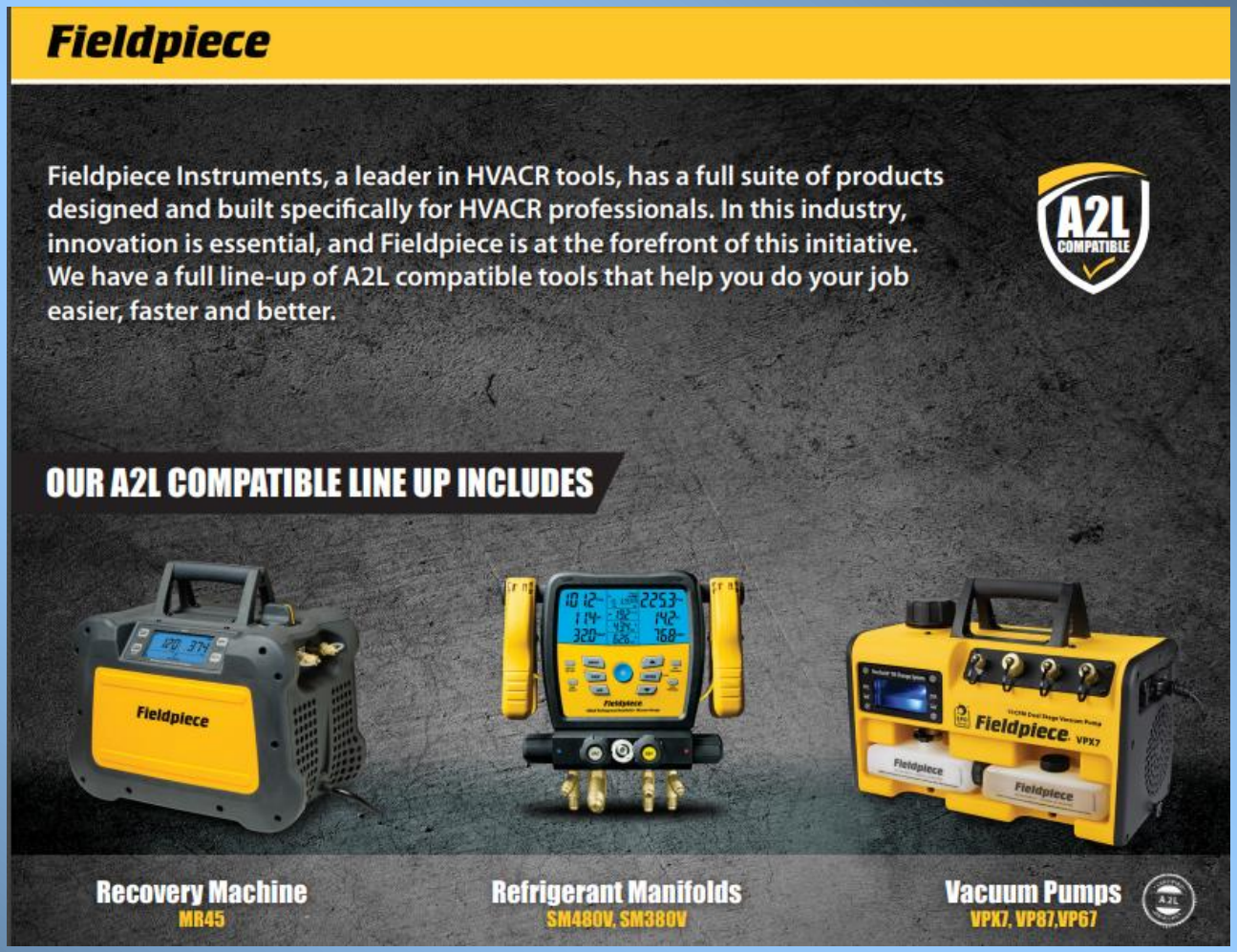
Product	Description	2023				2024				2025			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
AC	Greenspeed / Extreme VS AC (C / B)								■				
	VS AC (C / B)						■						
	2stg AC									■			
	South 1stg AC							■					
	North 1stg AC									■			
	3ph 1stg AC									■			
	Horiz. AC											■	
Furnace Coil	V-Coil Vert				■								
	V-Coil MP				■								
	A-Coil MP							■					
	Slab-Coil MP					■							
HP	Greenspeed / Extreme VS HP (C / B)								■				
	VS HP (C / B)						■						
	2stg HP									■			
	3ph 1stg HP									■			
	1stg HP				■								
Fan Coils	MF (3rd party) 454B								■				
	Entry Tier 454B					■							
	Mid Tier 2-stage 454B (InteliSense)					■							
	High Tier Var Spd 454B						■						
Gas Furnace	Entry - GF	Separate kit to connect into G terminal											
	Mid - GF												
	Dlx - GF	Separate kit to connect into G or ABCD terminal											
SPP	Entry MH									■			
	Entry G							■					
	Mid G									■			

■ Ready to Ship

Dec 2022 plan based on anticipated launch timing and supply chain readiness, subject to change

- *Dates indicate readiness to ship Puron Advance® product. These are not hard cutover timelines.*
- *Evaluating allocation model to drive early shipment of Puron Advance® products*
- *Speed of phase out of R410a will depend on a factors such as demand, availability and price of R410a, state codes, etc.*

SUMMARY



Next Gen Refrigerants	A2L certified	A2L certified	A2L certified

Leak detector Notes

- Detects all HFC, CFC, HCFC, HFO and blends

SUMMARY

YELLOW JACKET® A2L COMPATIBLE SERVICE TOOLS

A2L COMPATIBLE

P/N #	Refrigerant Recovery Machines
95780	*Turbo*Recover™ for North America
95782	*Turbo*Recover™ for North America with Tank Overfill Switch
95783	*Turbo*Recover™ with EU, UK and AU/NZ Power Cords
95760	RecoverXLT® 115V/60 Hz
95762	RecoverXLT® 115V/60 Hz with tank overfill switch
95764	RecoverXLT2-AP™ Refrigerant Recovery System

P/N #	BLDC Vacuum Pumps
93740	SuperEvac® PLUS II 4 CFM
93760	SuperEvac® PLUS II 6 CFM
93780	SuperEvac® PLUS II 8 CFM
93870	BULLET® DC 7 CFM

P/N #	Leak Detector and Refrigerant Charging Scale
69320	AccuProbe™ IR Refrigerant Leak Detector
68864	Wireless Refrigerant Charging Scale

P/N #	YJACK® Wireless Probes and Kits
67060	YJACK PATH® Range Extender
67061	YJACK® Temperature Clamp
67062	YJACK® Temperature Strap
67063	YJACK DEW® Psychrometer
67065	YJACK PRESS® Pressure Gauge
67066	YJACK VAC® Vacuum Gauge
67067	YJACK AMP® Current Probe
67068	YJACK MANO® Manometer NEW!
67070	**YJACK® Temperature Clamp Kit:** YJACK® Temperature Clamps (2) and YJACK PATH®
67071	**YJACK® Temperature & Humidity Kit:** YJACK® Temp. Clamps (2), YJACK DEW® Psychrometers and YJACK PATH®
67072	**YJACK® Charging Kit:** YJACK PRESS® Pressure Gauges (2) and YJACK® Temperature Clamps (2)
67073	**YJACK® Charging & Air Kit:** YJACK PRESS® Pressure Gauges (2), YJACK® Temp. Clamps (2), YJACK DEW® Psychrometer
67074	**YJACK® Charging & Evacuation Kit:** YJACK PRESS®(2), YJACK® Temperature Clamps (2) and YJACK VAC®

P/N #	Digital Adjustable Torque Wrenches
60624	Deluxe Digital Adjustable Torque Wrench
60648	Digital Adjustable Torque Wrench

P/N #	RealTorque® Core Removal Tools
18991	RealTorque® 1/4" Vacuum/Charge Valve w/Side Port
18992	RealTorque® 5/16" Vacuum/Charge Valve w/Side Port
18994	RealTorque® 1/4" Male x 5/16" Female Vacuum/Charge Valve with 1/4" Side Port
69111	RealTorque® 1/4" SuperHeat Kit with Torque CRT
69112	RealTorque® 5/16" SuperHeat Kit with Torque CRT

P/N #	P51 TITAN® Digital Manifolds
40870	P51-870 TITAN® Digital Manifold Kit
40875	P51-870 TITAN® Digital Manifold Kit, 5/16" Ball Valve Hoses
40877	P51-870 TITAN® Digital Manifold Kit with 5/16" Ball Valve Hoses and YJACK® Wireless Temperature Clamps
40860	P51-860 TITAN® Digital Manifold

P/N #	Series 41 Digital Manifolds
46060	Series 41 Digital Manifold
46062	Series 41 Digital Manifold, 3-Pak PLUS II™ Hoses with Compact Ball Valves

P/N #	A2L Manifolds for R-32/454B/410A
42035	Series 41 R32/454B/410A PSI °F Manifold NEW!
42036	Series 41 R32/454B/410A PSI °F HAV60 NEW!
49974	TITAN® 4V R32/454B/410A PSI °F Manifold NEW!
49975	TITAN® 4V R32/454B/410A, PLUS II 1/4" Hose 60" RYB Compact Ball Valve, 3/8" Vacuum Hose 60" Y PSI °F NEW!
46014	BRUTE II® R32/454B/410A PSI °F Manifold NEW!
46015	BRUTE II® R32/454B/410A, PLUS II 1/4" Hose 60" RYB Compact Ball Valve, 3/8" Vacuum Hose 60" Y PSI °F NEW!

P/N #	A2L Adapters & Hoses for R-32/454B/410A
19124	Adapter 1/4" LH FFL TO 1/4" RH MFL, STR NEW!
19180	Adapter 1/4" LH FFL TO 1/4" RH MFL, 45° NEW!
19204	Adapter 1/4" LH FFL TO 1/4" RH MFL, 90° NEW!
30260	PLUS II™ Hose Y, 60" ¼" LH to ¼" RH, 45° Fitting NEW!
30460	PLUS II™ Hose Y, 60" ¼" LH, ¼" RH, 45° w/Ball Valve NEW!
30660	PLUS II™ Hose Y, 60" ¼" LH to ¼" RH, 90° Fitting NEW!

P/N #	Series 41 Manifolds
42021	Series 41 R32/410A Manifold, bar/psi, °F °C
42024	Series 41 R32/410A, 60" RYB Hose, bar/psi, °F °C

P/N #	BRUTE II® and TITAN® Refrigerant Manifolds
46000	BRUTE II® R32/410A Manifold, R/B gauges, bar/psi, °F °C
46003	BRUTE II® R32/410A Manifold, 60" PLUS II Hose compact ball valve RYB and 3/8" x 45°, R/B gauges, bar/psi, °F °C
49960	TITAN® 4V R32/410A, 60" RYB Hose, compact ball valve, 3/8" x 45°, °F °C
49962	TITAN® 4V R32/410A Manifold only, °F °C
49965	TITAN® 4V R32/R410A Manifold, 60" PLUS II™ RYB, 3/8" x 45°

Scan QR Code for Full Product Listing of YELLOW JACKET® A2L Compatible Tools.

yellowjacket.com/ /product/A2L-compatible-service-tools/

Ritchie Engineering Co. / YELLOW JACKET® www.yellowjacket.com 1-800-769-8370 custserv@yellowjacket.com