Johnson Controls

PENN

A2L & A3 Refrigerants: A Compliance Guide and PENN Controls Progress Report

Presented by the Johnson Controls PENN Team

The power behind **your mission**

Agenda

1. **Environmental Regulatory Landscape**
   - International Regulations
   - Europe F-Gas Regulations
   - U.S. Climate Alliance
   - U.S. State building codes (A2L and A3 refrigerants)
   - U.S. State building energy codes
   - Canada Environmental Regulations
2. **A2L and A3 refrigerants and their properties**
3. **What are the regulations related to A2L and A3 refrigerants?**
   - Equipment types, GWP limits, compliance deadline and installation deadline
   - U.L. NCKL2/8 and LZGH2/8 paths for component compliance (A2L and A3 refrigerants)
   - A2L refrigerant mitigation requirements
4. **A2L and A3 compliance status for PENN controls**
5. **Where to find the necessary documentation for PENN controls that are NCKL2/8 or LZGH2/8 compliant?**
6. **PENN System 550 mitigation control modules and GM series A2L refrigerant sensors**

Meet Your Moderator and Presenters

Keith Gifford
Global Product Manager

Bill Merritt
Director of Business Development

Anna Raschke
Associate Product Manager

Environmental Regulatory Landscape

F-Gas (Europe)

- Phasedown / Restrictions
- IEC 60335-2-89 (Refrigerant Charge Limits)

Asia Pacific Region

- Phasedown / Restrictions

Montreal Protocol

- Phase-out, like R22

Kigali Amendment

- Phasedown, like R410A

U.S. AIM Act

- Passed late 2020

U.S. EPA SNAP Rule 26

- Acceptable refrigerants
- Acceptable alternative refrigerants with modified use conditions
- Exempt R290 in refrigerated food processing and dispensing equipment for the Clean Air Act, section 208 venting prohibition
- References latest version of UL 60335-2-89, ASHRAE 15-2022 and ASHRAE 34-2022

California

- Air Resources Board (CARB)

New York

- Department of Environmental Conservation

U.S. Climate Alliance

- Acceptable refrigerants
- Acceptable alternative refrigerants with modified use conditions
- Exempt R290 in refrigerated food processing and dispensing equipment for the Clean Air Act, section 208 venting prohibition
- References latest version of UL 60335-2-89, ASHRAE 15-2022 and ASHRAE 34-2022

Johnson Controls

European Union New F-Gas Regulations (as of March 11, 2024)

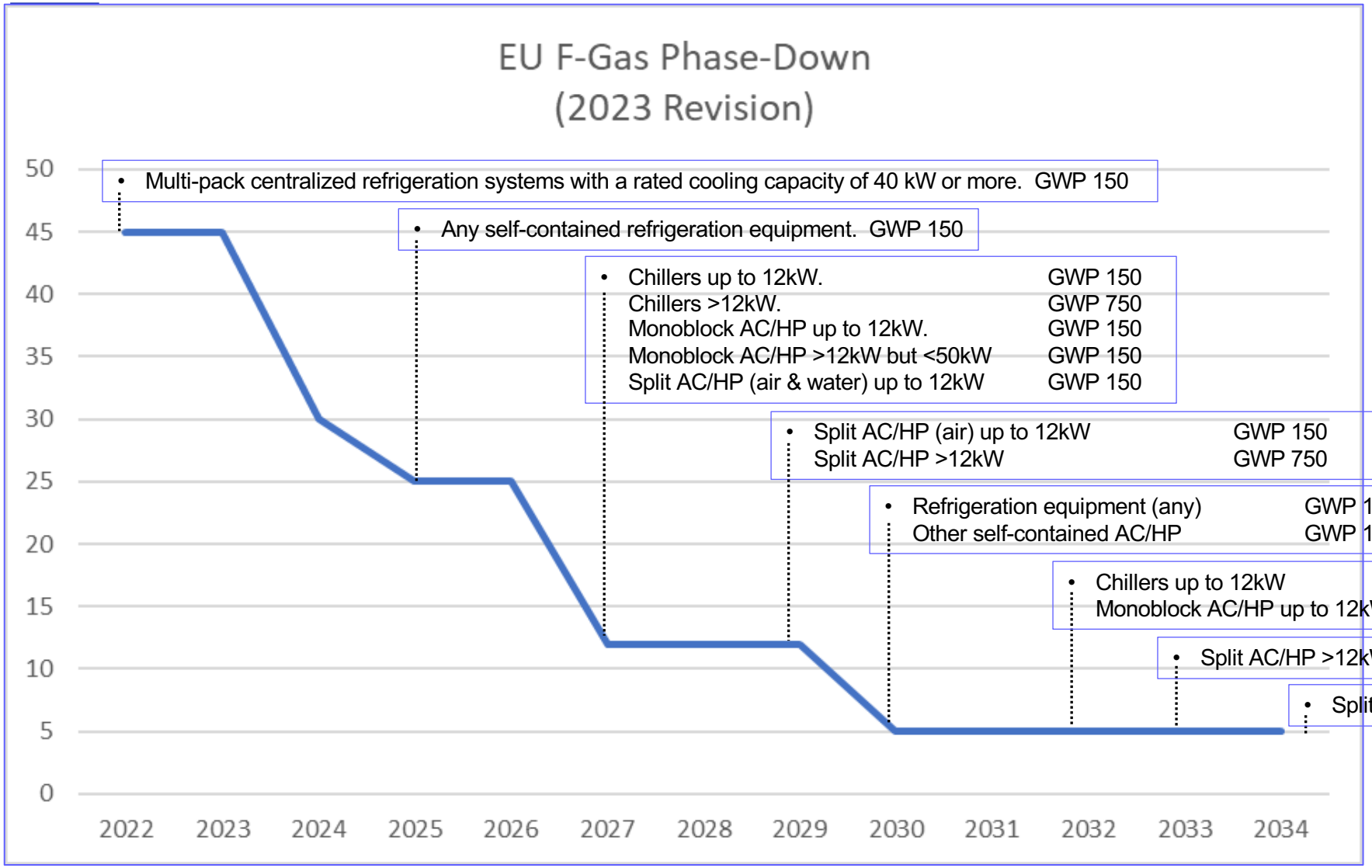
Key elements of the regulation are:

- **Phases down the consumption of hydrofluorocarbons (HFCs),** which are the most common type of F-gases, by 85% by 2036 compared to the average level in 2019-2020.
- **Bans the use of certain F-gases (HFCs) in new products and equipment**, such as refrigerators, air conditioners, heat pumps, fire extinguishers, and aerosols.
- **Requires the financing of the collection, treatment, recovery, environmentally sound disposal, recycling, reclamation, or destruction of F-gases** from waste electrical and electronic equipment.
- **Introduces new reporting and verification obligations** for producers, importers, exporters, and users of F-gases.
- **Supports the development and deployment of climate-friendly alternatives to F-gases**, such as natural refrigerants, through innovation funds and standards.

The regulation aims to contribute to the EU's goal of achieving climate neutrality by 2050 and to the implementation of the Paris Agreement on climate change. It also aims to protect the health and well-being of citizens from the environmental and economic impacts of F-gas emissions.

Johnson Controls

EU F-Gas Phase-Down*



- 2050: All HFCs are out
- 2030: Review of bans
- 2040: Review of quotas

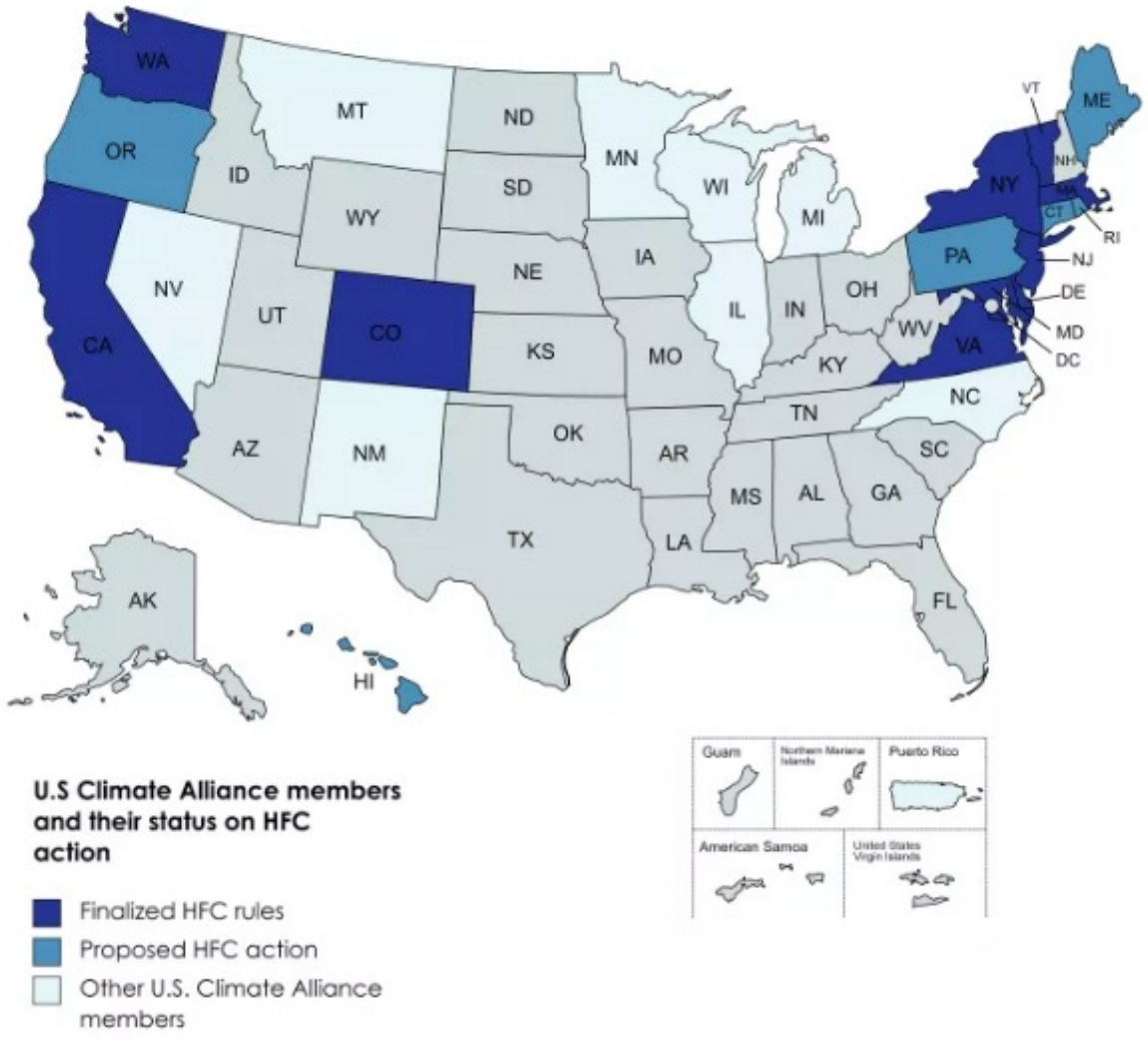
* F-Gas bans are tied to sufficient safety requirements and exemptions for low-temp conditions (< -50°C)

Johnson Controls

U.S. Climate Alliance

State led high-impact climate action

- Launched June 1, 2017, by the governors of Washington, New York and California
- Has grown to include twenty-five (25) governors across the U.S.
- Represents 60% of the U.S. economy and 55% of the U.S. population
- Eleven (11) states have finalized HFC rules



Source: States Keep Steady Course on HFC Regulations (nrdc.org)

https://usclimatealliance.org

Johnson Controls

California Air Resources Board (CARB)

Stationary Equipment

Passed resolution adding prohibitions on the use of certain HFCs in stationary refrigeration and air conditioning.

Air Conditioners, 750 GWP Limit

- Jan 1, 2023 - Window Air Conditioners and Dehumidifiers
- Jan 1, 2024 - Chillers (previous bill)
- Jan 1, 2025 - Residential & Light Commercial
- Jan 1, 2026 - VRF
- 2023 / 2024 - 10% reclaimed in new OEM equipment (excludes window units & dehumidifiers)

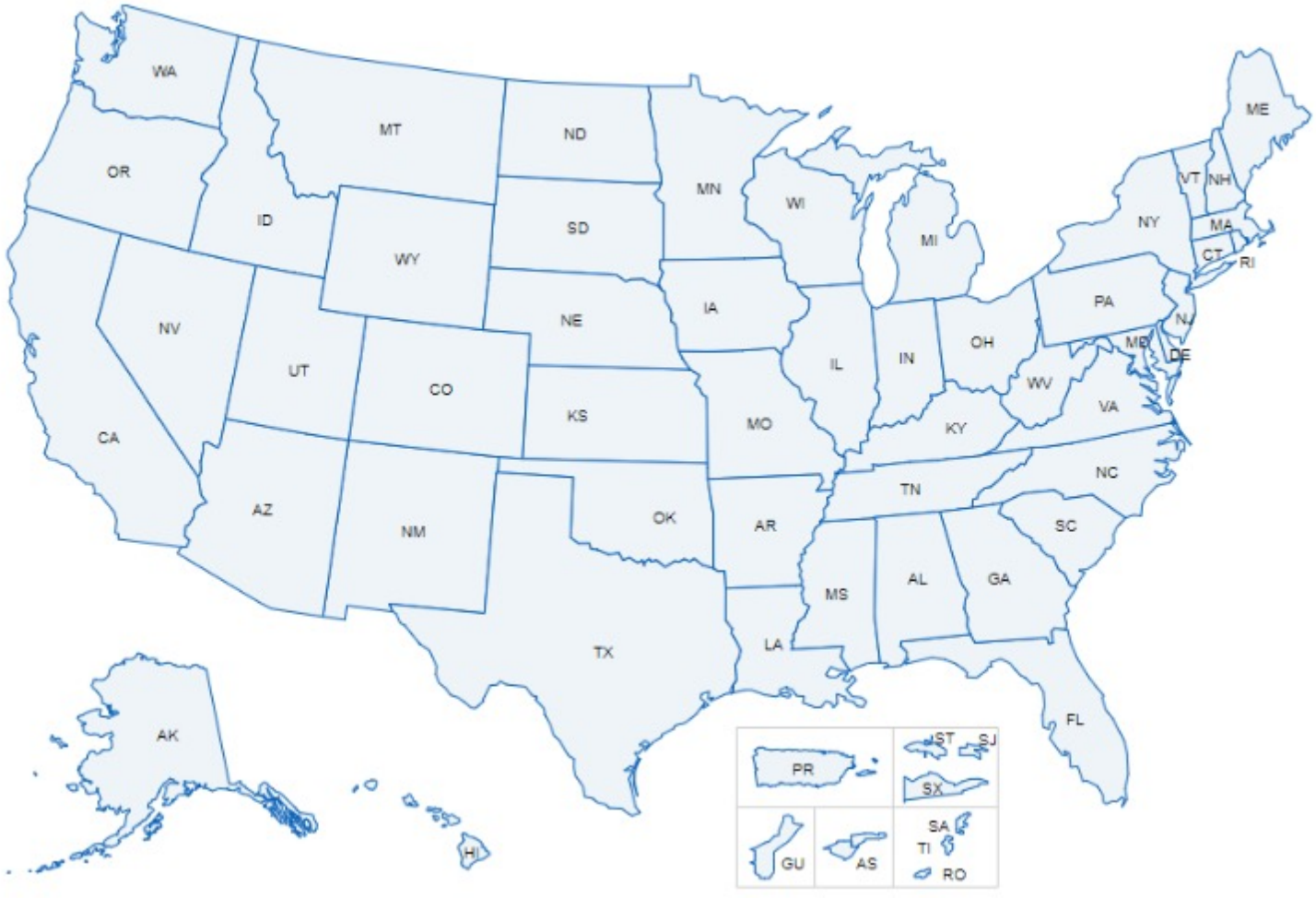
Commercial & Industrial Refrigeration

- Jan 1, 2022 - 150 GWP limit on new / major remodel Retail Facilities (systems over 50-lbs)
- Jan 1, 2022 - Existing Non-Retail Facilities GWP limits
- Industrial Refrigeration, 1,500 to 2,000 GWP
- Ice Rinks, 750 GWP
- Cold Storage, 1,500 GWP (current legislation)

Jan 1, 2030, Attain a company-wide weighted average of <1,400 GWP (55% reduction in Green house gas protocol below 2019 levels) for Food Retail stores

Johnson Controls

U.S. State Building Code Status | AHRI Interactive Map



A2l Refrigerant Building Code Map | AHRI (ahrinet.org)

Johnson Controls

U.S. State Building Code Status | AHRI Interactive Map | Georgia

Georgia

AC Codes
Updated: Yes
Effective Date: 1/1/2024

State Code - AC

Refrigeration Codes
Updated: Yes
Effective Date: 1/1/2024

State Code - Refrigeration

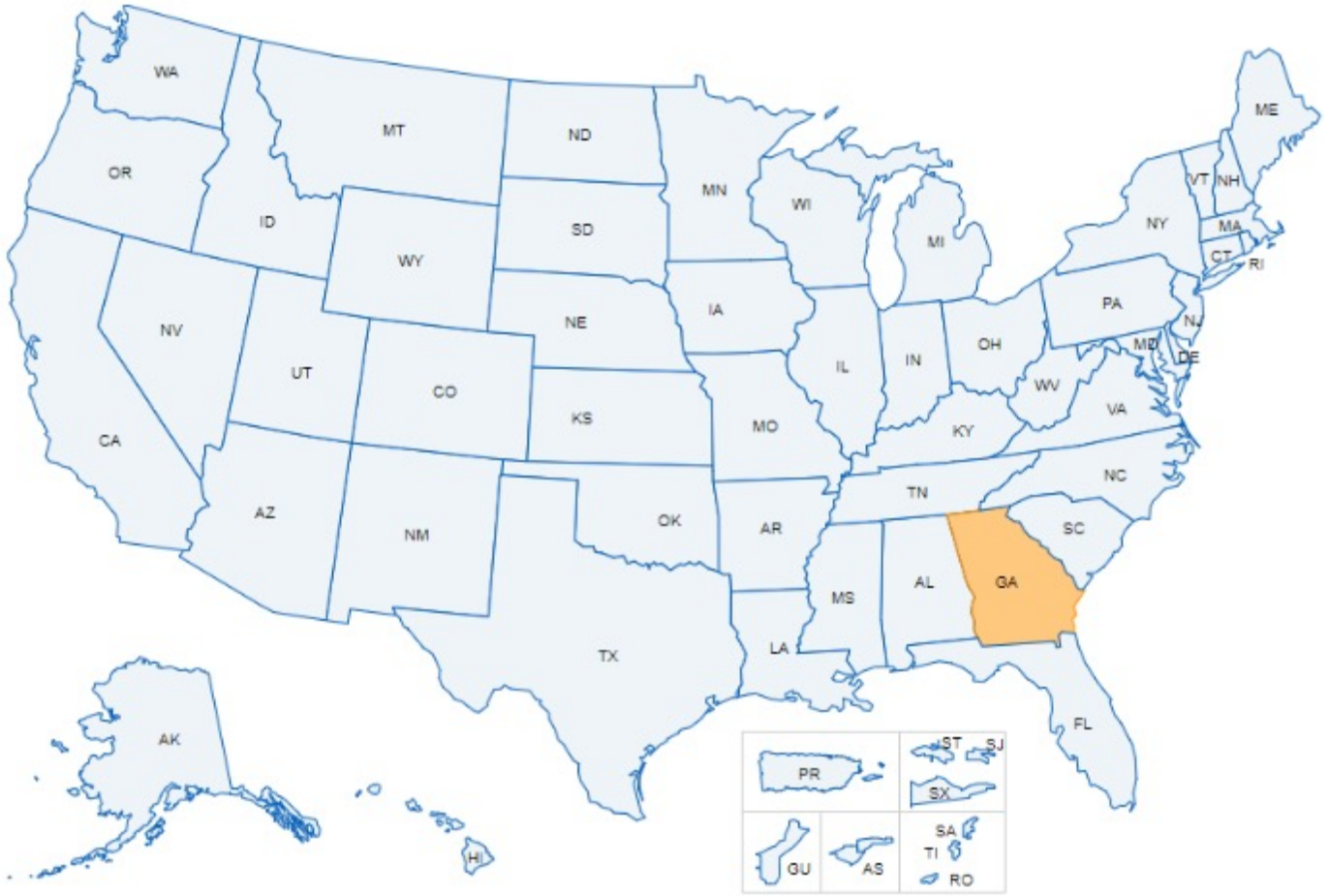
Warehousing Codes
Updated: No

State Code - Warehousing

Standards Currently Referenced
ASHRAE 15: Pre-2019
ASHRAE 34: Pre-2019
UL 60335-2-40: Pre-2019
UL 60335-2-89: n/a

Any questions?

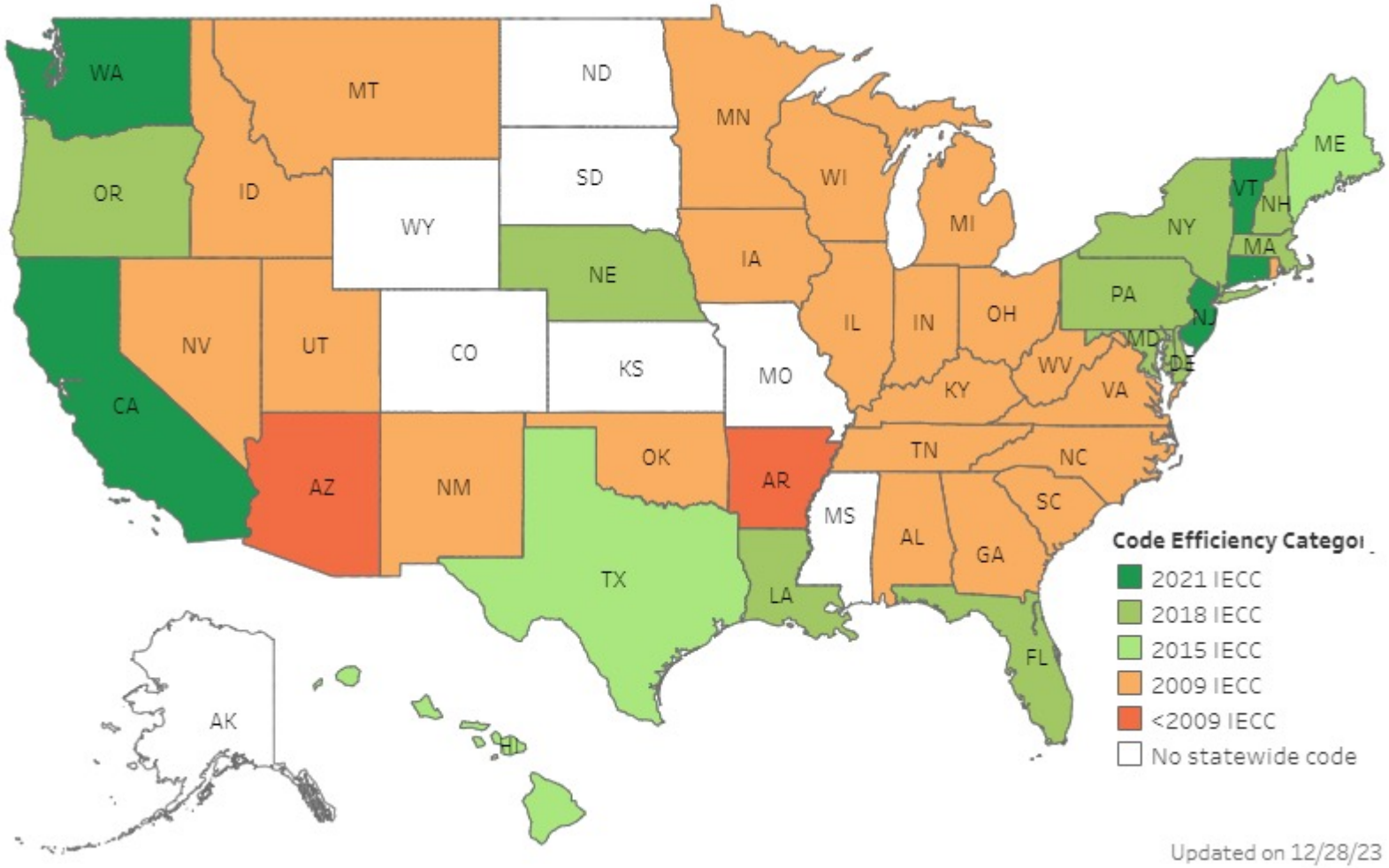
Contact Us →



A2l Refrigerant Building Code Map | AHRI (ahrinet.org)

Johnson Controls

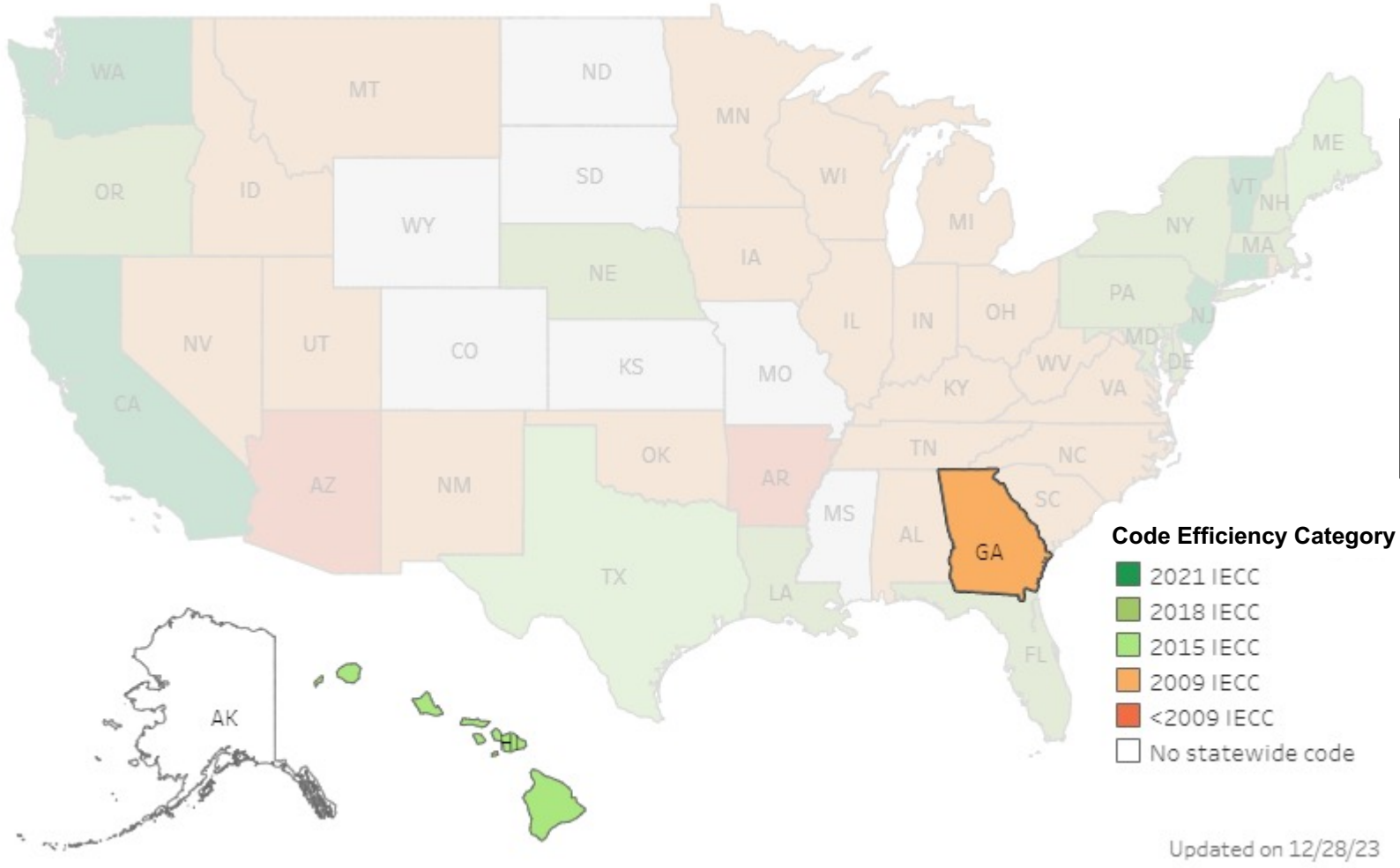
U.S. State Building Energy Codes | Interactive Map



State Portal | Building Energy Codes Program

Johnson Controls

U.S. State Building Energy Codes | Interactive Map



✓ Keep Only ⊘ Exclude

State: Georgia
Adopted State Residential Code: 2015 IECC with amendments
Efficiency Impact of Amendments (vs. model adopted code): -4.1%
Residential Code Efficiency Category: 2009 IECC

State Resources: Click to Access

1. State Page
2. State Fact Sheet
3. Residential Cost-Effectiveness Report
4. Single-Family Field Study Report

Code Efficiency Category

- 2021 IECC
- 2018 IECC
- 2015 IECC
- 2009 IECC
- <2009 IECC
- No statewide code

Updated on 12/28/23

State Portal | Building Energy Codes Program

Johnson Controls

Canada Ozone-depleting substances regulations

Under the *Kigali Amendment*, Canada is required to reduce its annual HFC consumption by 85% by 2036.

Phasedown Steps: starting Jan. 1	2019	2024	2029	2034	2036
% reduction **from baseline**	10%	**40%**	70%	80%	85%
Canada's Maximum Allowable HFC Consumption (tonnes CO2 equivalents)	16 207 916	**10 805 277**	5 402 639	3 601 759	2 701 319

Current step

Bulk HFCs require an authorization issued by ECCC in order to be imported into Canada:

- A consumption allowance to control imports of new bulk HFCs; or
- An import permit for used (recovered, regenerated or recycled) HFCs

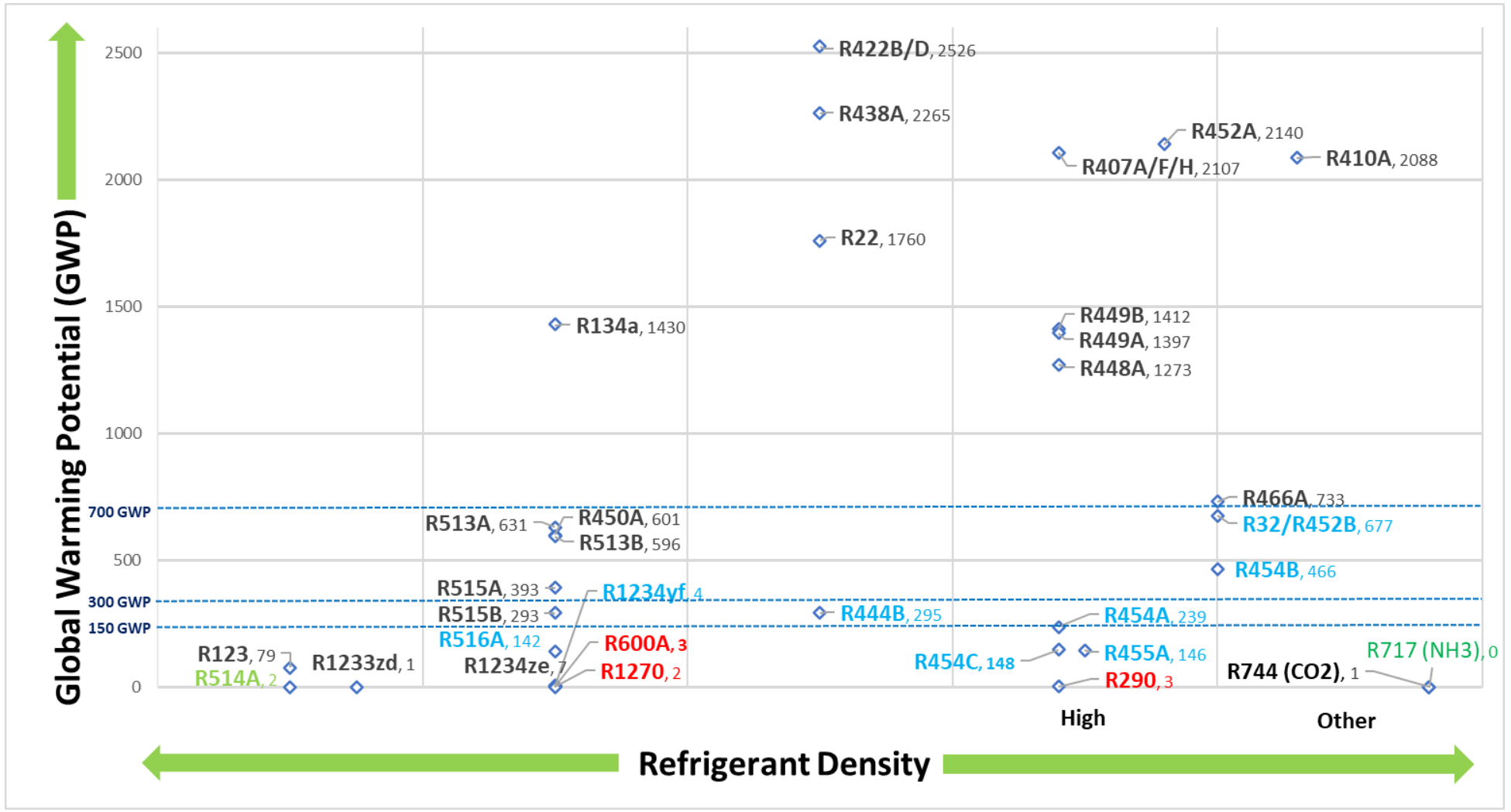
Johnson Controls

Canada Ozone-depleting substances regulations

Item	Product	Use	Date	Global Warming Potential (GWP) Limit of Refrigerant Used in Product
1	Stand-alone medium-temperature refrigeration system: self-contained refrigeration system with components that are integrated within its structure and that is designed to maintain an internal temperature ≥ 0°C	(a) Commercial or industrial	January 1, 2020	1 400
		(b) Residential	January 1, 2025	150
2	Stand-alone low-temperature refrigeration system: self-contained refrigeration system with components that are integrated within its structure and that is designed to maintain an internal temperature < 0°C but not < -50°C	(a) Commercial or industrial	January 1, 2020	1 500
		(b) Residential	January 1, 2025	150
3	Centralized refrigeration system: refrigeration system with a cooling evaporator in the refrigerated space connected to a compressor rack located in a machinery room and to a condenser located outdoors, and that is designed to maintain an internal temperature at ≥ -50°C	Commercial or industrial	January 1, 2020	2 200
4	condensing unit: refrigeration system with at a cooling evaporator in the refrigerated space connected to a compressor and condenser unit that are located in a different location, and that is designed to maintain an internal temperature at ≥ -50°C	Commercial or industrial	January 1, 2020	2 200
5	chiller: refrigeration or air-conditioning system that has a compressor, an evaporator and a secondary coolant, other than an absorption chiller	Commercial or industrial	January 1, 2025	750
6	mobile refrigeration system: refrigeration system that is normally attached to or installed in, or operates in or with a means of transportation	Commercial or industrial	January 1, 2025	2 200

Johnson Controls

A2L and A3 Refrigerants and their properties



Refrigerant Safety Classification

A1	Non-flammable
A2L	Mildly flammable
A3	Highly flammable
B1	Toxic, Non-flammable
B2L	Toxic, Less flammable

Johnson Controls

Equipment Types, Compliance Dates and Sell-Thru Deadline

Equipment Type	Compliance Deadline	Installation Deadline	GWP Limit	Prohibited Refrigerant(s)	Allowable Refrigerants
Residential and Light-Commercial Air Conditioners and Heat Pumps	Jan. 1, 2025	Jan. 1, 2026	700	R410A	R32, R454B, naturals
VRF (Variable Refrigerant Flow) systems	Jan. 1, 2026	Jan 1, 2026	700	R410A	R32, R454B, naturals
Chillers, Comfort Cooling	Jan. 1, 2025	Jan. 1, 2025	700	R410A, R134A	R513A, R515B, R1234ze
Data Centers, Computer Room Air Cond.	Jan. 1, 2027	Jan. 1, 2027	700	R410A	
Commercial Refrigeration, Stand-alone (Self-Contained)	Jan. 1, 2025	Jan. 1, 2026	150	R404A, R407A, R134A	R454A*, R454C, R455A, naturals
Commercial Refrigeration (>500 grams of refrigerant)	Jan. 1, 2027	Jan. 1, 2027	-	R404A, R407A, R407C, R407F, R448A, R449A, R452A, etc.	R454A*, R454C, R455A, naturals
Self-Contained Automatic Commercial Ice Machines, <=1,200 lbs. ice / 24 hrs.	Jan. 1, 2026	Jan. 1, 2026	150	R134A	R290, R600A
Self-Contained Automatic Commercial Ice Machines, >1,200 lbs. ice / 24 hrs.	Jan. 1, 2027	Jan. 1, 2027	-	R404A, R410A	R454A*, R454B, R32, naturals
Retail Food, Supermarkets, >=200 lbs. refrigerant charge	Jan. 1, 2027	Jan. 1, 2027	150	R404A, R407A, R407C, R407F, R448A, R449A, R452A, etc.	R454A*, R454C, R455A, naturals
Retail Food, Supermarkets, <200 lbs. refrigerant charge	Jan. 1, 2027	Jan. 1, 2027	300	R404A, R407A, R407C, R407F, R448A, R449A, R452A, etc.	R454A*, R454C, R455A, naturals

Regulatory Actions for Technology Transitions | US EPA

Restrictions on the Use of Certain HFCs under Subsection (i) of the AIM Act (epa.gov)

* R454A included in SNAP Rule 26

IEC 60335-2-89, Global Standard

Refrigerant Charge Limits

R290 (Propane) has primarily been used in smaller capacity, self-contained refrigerated cabinets. Designing larger-capacity R290 cabinets has required the use of multiple compressors or condensing units.

The updated IEC standard raises the R290 charge limits on these self-contained refrigerated cabinets to 500-grams, regardless of the design (i.e., open vs. closed design).

The following countries have already adopted the new standard:

- Brazil
- Australia/New Zealand, new standard published in 2020
- Japan, new JIS standard published in 2021

NOTE: U.S. EPA SNAP 26 includes 300-gram (closed cases) and 500-gram (open cases) charge limits for R290

Johnson Controls

A2L Refrigerant Mitigation Requirements

UL Standard 60335-2-40, Air Conditioners and Heat Pumps

UL Standard 60335-2-89, Commercial Refrigeration Systems

- An integral component to mitigate the risk of flammability is a ***refrigerant leak detection system (RLDS)*.**
- Refrigerant leak detectors that sense loss of pressure are one of the primary mitigation means for systems in the ***occupied space exceeding a prescribed refrigerant charge limit***, which typically consists of approximately 4-pounds of refrigerant for most permanently installed applications.
- Refrigerant leak detection systems are required to have both ***sensors and control logic electronics that activate evaporator fan(s) and use circulated air to quickly disperse and dilute refrigerant in the event of a leak*.** This is intended to prevent the formation of refrigerant concentrations.
- Requires that refrigerant ***charge limits be based on the minimum occupied volume of the room where the equipment is expected to be used*.** This charge limit requirement also includes a safety factor of four to ensure any leaked refrigerant is diluted to well below the lower flammability limit (LFL), based on room size.

Johnson Controls

A2L Refrigerant Mitigation Requirements

- Refrigerant Leak Detection Systems (RLDS) must be designed to detect ***refrigerant leaks at various points of the refrigeration system as approved by the safety listing agency***, from the compressor to the condensing unit, for every equipment model.
- In the event of a refrigerant leak at any point within the refrigeration system, RLDS must take-action within 30 seconds to mitigate flammability risks. ***Safety strategies require both detection of the leak and methods to quickly mitigate or lower the concentration of the A2L refrigerant below its 25% LFL:***
  - Safety shut-off or isolation valves to limit the amount refrigerant released
  - Air circulation fans, including evaporator fans, and/or ventilation schemes
  - Integrated systems with A2L logic
- Refrigerant ***charge calculations and mitigation methods are based on the refrigerant's flammability rating, the size of the refrigerated space, location, and type of application***.
- The charge calculation also determines the ***allowable releasable charge limit*** which is not necessarily the full system charge.

Johnson Controls

A2L Refrigerant Leak Detection Systems (RLDS)

Requirements:

- RLDS must be listed by the manufacturer with a nationally recognized certification agency for the specific equipment on which they will be installed and may be ***factory or field installed*** with refrigerant leak sensors optimally located per safety agency approval to detect any leaks.
- Refrigerant leak sensor ***LFL mitigation trigger point is factory set and sealed with no field adjustment.*** Routine factory inspections are conducted by UL as part of the listing requirement. Leak sensor markings must identify the manufacturer and the specific A2L refrigerant.
- Refrigerant leak detection system is required to ***initiate mitigation at a maximum concentration of <25% of the refrigerant's LFL.*** The 4X safety factor helps ensure that flammable concentrations aren't reached.
- Refrigerant leak detection systems are required to ***turn on mitigation devices.***
- ***Self-test protocols*** embedded in the refrigerant leak sensor run every hour, ensuring proper operation. In the event of a sensor failure, the system will go into mitigation and stay in mitigation until such time that the failed refrigerant leak sensor is replaced.
- The refrigerant leak detector and its firmware are considered part of a ***Protective Electronic Circuit.***
- The refrigerant leak detector ***shall not be subject to poisoning, damage or false alarms*** from common household and workplace contaminants which have not been approved by the safety listing agency.
- Refrigerant leak detection systems are required to ***pass testing designed to address long term stability, vibration, range and setpoint verification.***
- Refrigerant leak sensors which have a ***defined life must provide notice of replacement after reaching end-of-life.***

Johnson Controls

North America Certifications for Components used in HVACR systems using A2L or A3 refrigerants UL NCKL2/8 and LZGH2/8 Compliance

JCI PENN products can be used today in HVACR equipment using A2L and/or A3 refrigerants

- Requires that HVACR equipment manufacturers perform testing to ensure that in the event of a refrigerant leak, ignition is not possible.
- Our objective is to limit the testing that OEM customers need to perform to certify their HVACR equipment for use with A2L and/or A3 refrigerants
- OEM customers prefer that Johnson Controls' PENN products are UL Certified as "Ignition Proof" or "Flame Arrest-Protected" components.

Johnson Controls

North America – Certification Path for A2L & A3 Refrigerants

UL established two (2) new Component Categories & Certification Schemes for use with A2L &A3 Refrigerants.

- These Component Certifications make it easier for Original Equipment Manufacturers to apply components
- Reduced OEM system level testing and greater interchangeability of components

1) A2L & A3 Certification

NCKL2/8 "Ignition Proof Components" Components for use in A2L or A3 HVAC/R systems. Varied testing schemes can be chosen based on a reasonable and appropriate subset of the Hazardous Location (ATEX) standards.

- Non-Sparking
- Seal/hermetically sealed
- Non-Incendive component
- Intrinsically safe
- Enclosed break/flameproof

2) A2L Only Certification (Much easier to achieve)

LZGH2/8 "Flame Arrest-protected Components" Components for use in A2L HVAC/R systems. Based on testing within UL/IEC60335-2-40. Varied approaches can be taken to prove compliance.

- Allowable opening of components to prevent ignition of A2L's
- Flame arrest enclosure
- Low VA contacts

One can also choose to achieve a Hazardous Location or ATEX certification. But the requirements are difficult and excessive.

Johnson Controls

A2L / A3 Compliance Status for PENN Controls

A2L Compliance (LZGH2/8)

Completed

Group 1: A11, A19, A25, A28PA, A28PJ & T19 series temperature controls, P20/P21, P32, P70EA/P170EA, P70SA, P12AA & P74 series pressure controls, P28/P128, P29 & P45 series lube oil controls, F61/F261 & F262 series flow switches, F263 series liquid level controls. **Compliance report available on UL's Product iQ website.**

Group 2: P77 and P78 pressure controls. **Compliance report available on UL's Product iQ website.**

Group 4: A421 series electronic temperature controls, P470 series electronic pressure controls, P545 series electronic lube oil controls and System 450 modular electronic controls. **Compliance report available on UL's Product iQ website.**

In-Process

Group 3: P47, P67, P70/P170, P72 & P74 series pressure controls. **Product design changes required. Redesigned product submitted to UL, testing complete and approved by UL. Product design changes being implemented by JCI. Production dates TBD.**

Group 7: VFD68 and VFD70 series variable frequency drives. **Pending**

Johnson Controls

A2L / A3 Compliance Status for PENN Controls

A2L & A3 Compliance (NCKL2/8)

Completed

Group 5: P597 and P599 series pressure transducers. **Compliance report available on UL's Product iQ website.**

Group 6: P266 series electronic fan speed controllers. **Compliance report available on UL's Product iQ website.**

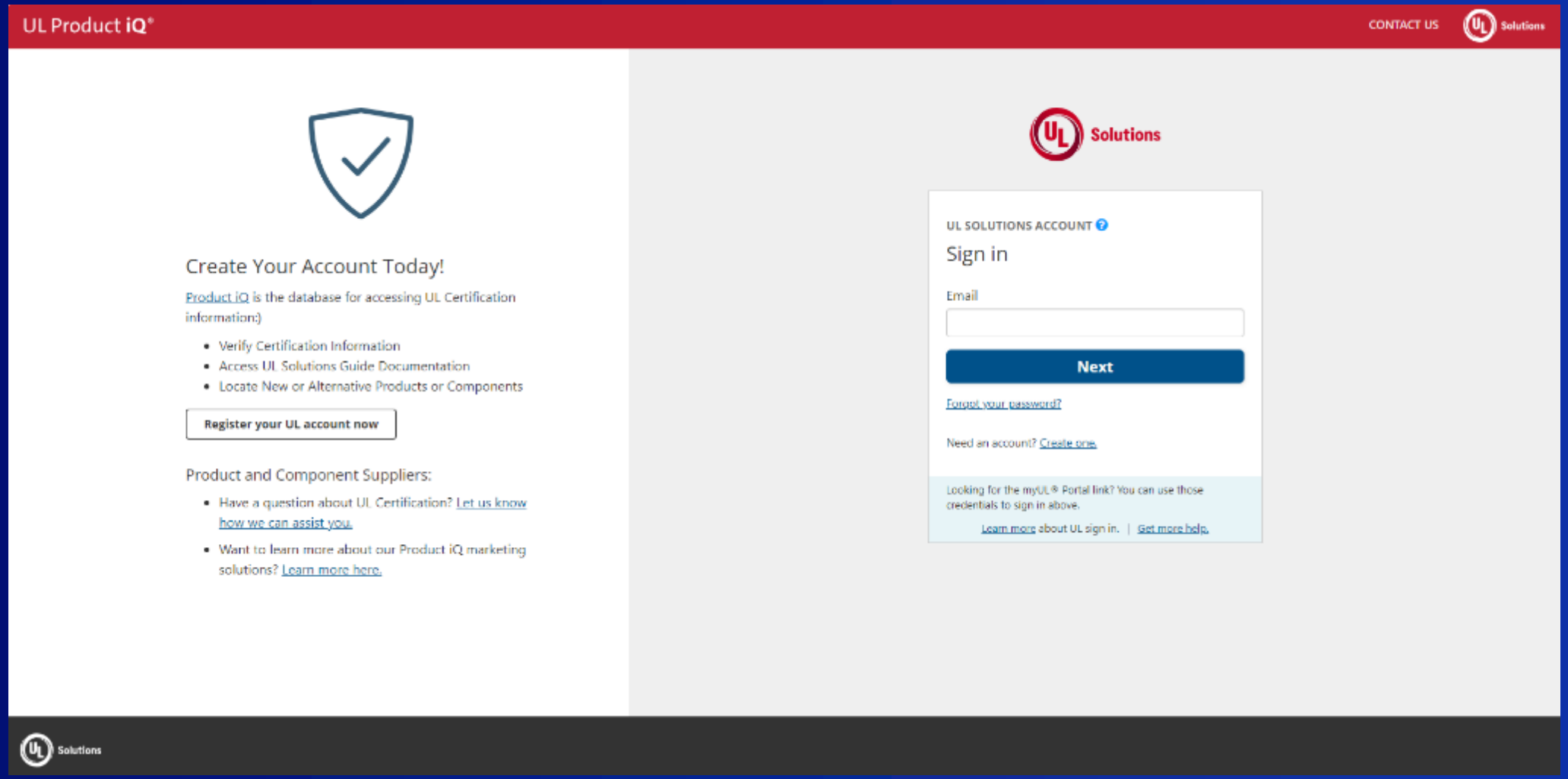
In-Process

Group 4: TC series electronic case temperature and defrost controllers. **Pending**

Group 5: P100 series encapsulated pressure switches. **In-process with UL.**

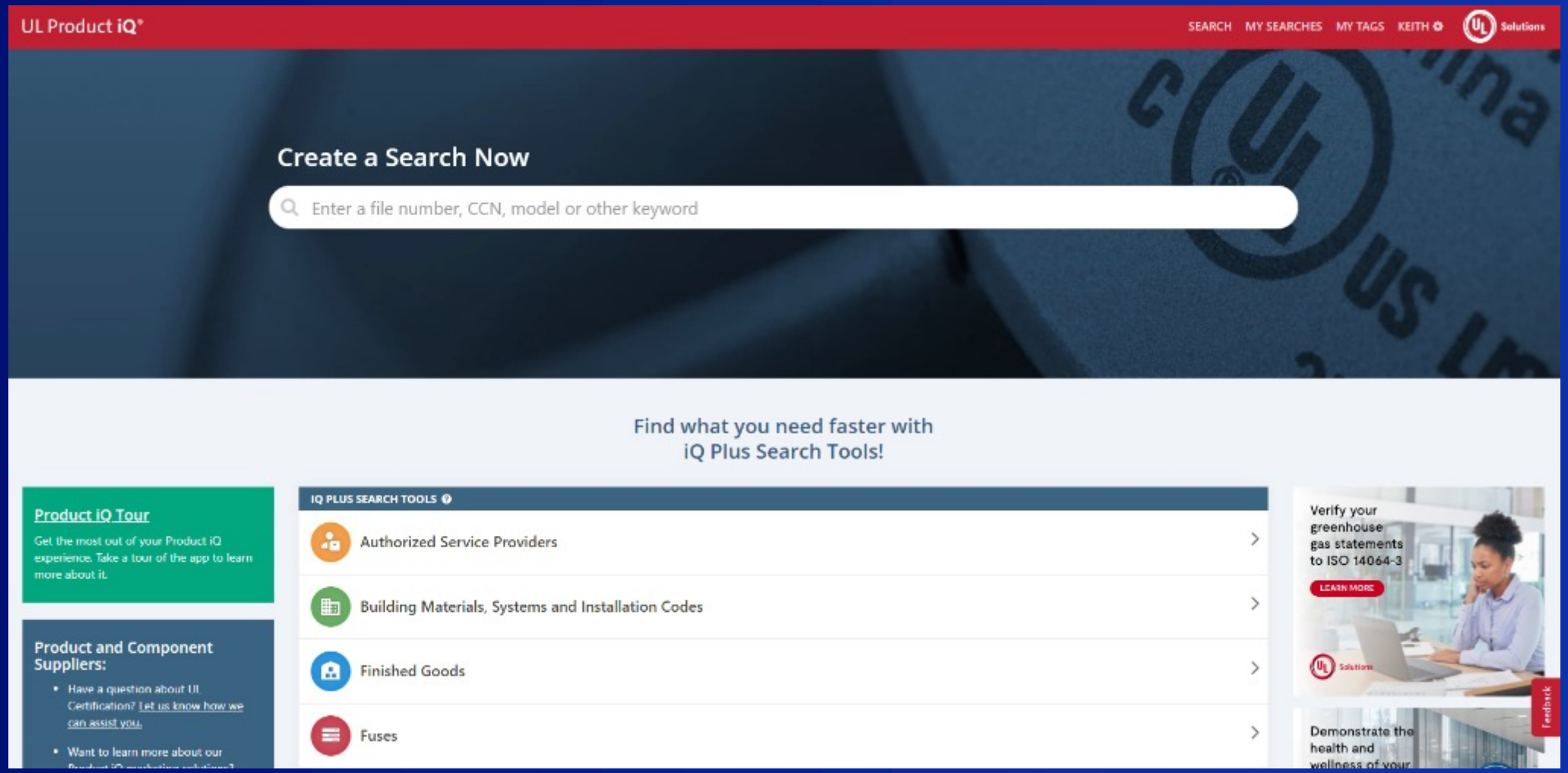
Johnson Controls

U.L. Product iQ Document Portal



UL Product iQ (ulprospector.com)

U.L. Product iQ Document Portal



UL Product iQ (ulprospector.com)

U.L. Product iQ Document Portal | Johnson Controls

271 Results :: *Keyword: johnson controls*

Action ▾ Display: General ▾

« 1 2 3 4 5 »

Document Name	Company Name	Notes	UL CCN Description
ACOT.SA5293	Hitachi-Johnson Controls Air Conditioning Inc		Air Conditioners, Room
ACOT7.SA5293	Hitachi-Johnson Controls Air Conditioning Inc		Air Conditioners, Room Certified for Canada
AGGZ.E318787	JOHNSON CONTROLS INC		Electrostatic Air Cleaners, Fixed
AGGZ.E522813	JOHNSON CONTROLS AIR CONDITIONING AND REFRIGERATION (WUXI) CO LTD		Electrostatic Air Cleaners, Fixed
AGGZ7.E318787	JOHNSON CONTROLS INC		Electrostatic Air Cleaners, Fixed Certified for Canada
AHIV.E318784	JOHNSON CONTROLS INC		Humidifiers
AHIV7.E318784	JOHNSON CONTROLS INC		Humidifiers Certified for Canada
AJZV.R25853	JOHNSON CONTROLS INC		Filter Units, Air
ALEV.R25852	JOHNSON CONTROLS INC		Mechanical Air Cleaners
ALVY.BP4166	JOHNSON CONTROLS INC		Access Control System Units
ALVY.S3250	JOHNSON CONTROLS INC		Access Control System Units
ANATEL - BRBL.BR5035	Johnson Controls BE do Brasil Ltda		Brazilian Certification Services - Restricted Radiation Equipment
APOU.BP4166	JOHNSON CONTROLS INC	Historical	Proprietary Alarm Units
APOU.BP4166	JOHNSON CONTROLS INC		Proprietary Alarm Units
APOU.S1570	JOHNSON CONTROLS INC	Historical	Proprietary Alarm Units

« 1 2 3 4 5 »

1 of 19

U.L. Product iQ Document Portal | LZGH2, Johnson Controls

3 Results :: *Keyword: lzgh2 :: Company Name: JOHNSON CONTROLS INC*

Action ▾ Display: General ▾

Document Name	Company Name	Notes	UL CCN Description
LZGH2.E27734	JOHNSON CONTROLS INC		Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants
LZGH2.E533907	JOHNSON CONTROLS INC		Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants
LZGH2.SA516	JOHNSON CONTROLS INC		Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants

« 1 »

1 of 1

U.L. Product iQ Document Portal | LZGH2, Johnson Controls

Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants

COMPANY

E27734

Johnson Controls Inc
507 E Michigan St
Milwaukee, WI 53202-5202 United States

Sensing/Operating Control, Model(s): *C450* followed by C, G, R, S, or Y followed by B, C, E, N, P, Q or R followed by N or G, or up to seven additional alphanumeric characters

Model(s): *A421AB* followed by C, D, G, J, T, W, may be followed three alpha numeric digits, may be followed by C or D

Model(s): *A421AE* followed by C, D, J, T, W, may be followed three alpha numeric digits, may be followed by C or D

Model(s): *A421FB* followed by F, R, may be followed three alpha numeric digits, may be followed by C or D

Model(s): *A421FE* followed by F or R, may be followed three alpha numeric digits, may be followed by C or D

Model(s): *A421GAE* followed by F or R, may be followed three alpha numeric digits, may be followed by C or D

Model(s): *A421GB* followed by F, R, may be followed three alpha numeric digits, may be followed by C or D

Last Updated on 2024-01-05

LZGH2.E27734 - Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants | UL Product iQ (ulprospector.com)

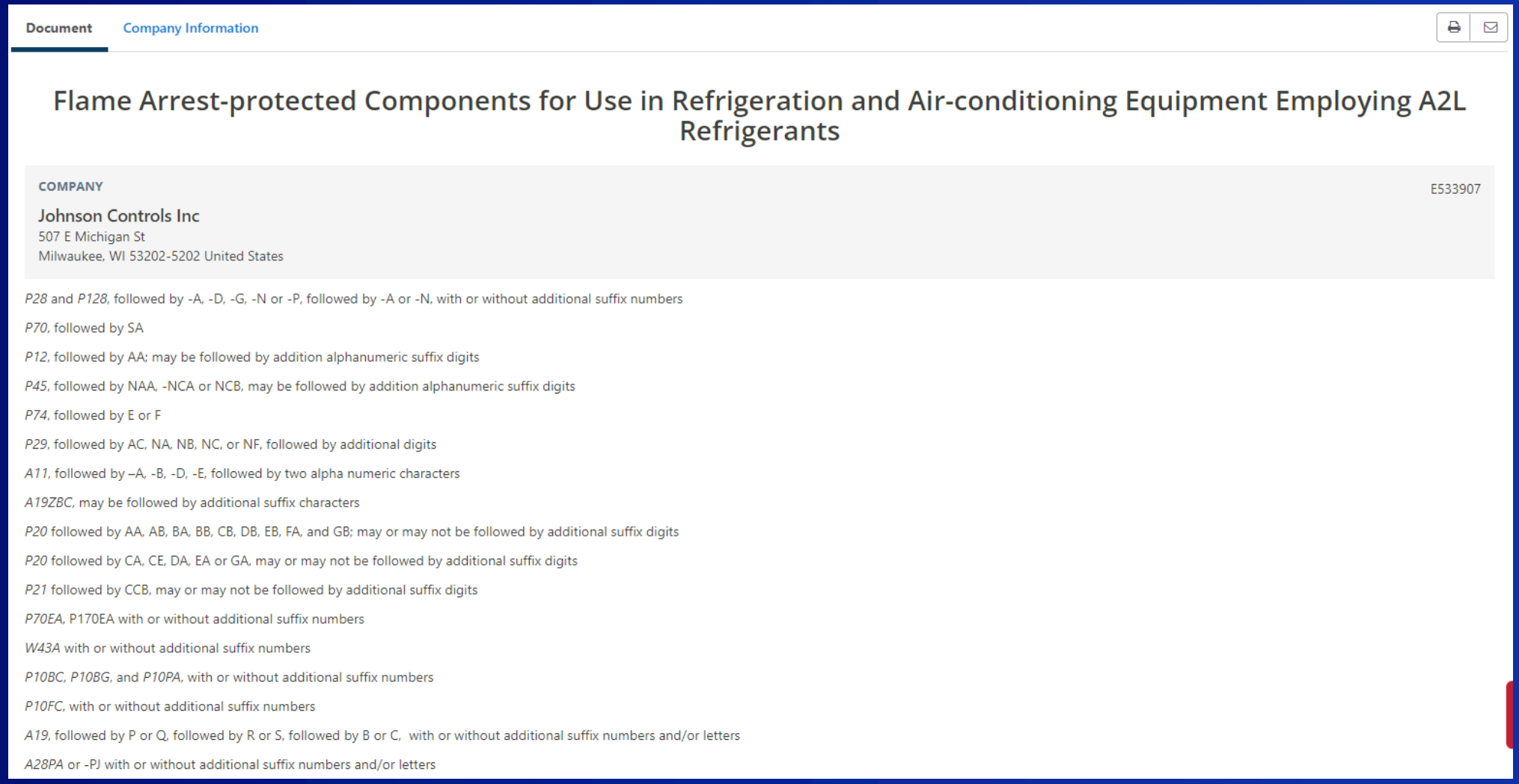
PENN System 450 and A421 Series

Product Group	Product Category	Design Impact	Certification Scheme	Status
4	**System 450 Modular Electronic Controls** C450	None	LZGH2/8 UL File no. E27734	UL Certification Complete
4	**Electronic Temperature Controls** A421 Series	None		

System 450

A421 Series

U.L. Product iQ Document Portal | LZGH2, Johnson Controls



Document | Company Information

Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants

COMPANY

E533907

Johnson Controls Inc
507 E Michigan St
Milwaukee, WI 53202-5202 United States

P28 and *P128*, followed by -A, -D, -G, -N or -P, followed by -A or -N, with or without additional suffix numbers

P70, followed by SA

P12, followed by AA; may be followed by addition alphanumeric suffix digits

P45, followed by NAA, -NCA or NCB, may be followed by addition alphanumeric suffix digits

P74, followed by E or F

P29, followed by AC, NA, NB, NC, or NF, followed by additional digits

A11, followed by –A, -B, -D, -E, followed by two alpha numeric characters

A19ZBC, may be followed by additional suffix characters

P20 followed by AA, AB, BA, BB, CB, DB, EB, FA, and GB; may or may not be followed by additional suffix digits

P20 followed by CA, CE, DA, EA or GA, may or may not be followed by additional suffix digits

P21 followed by CCB, may or may not be followed by additional suffix digits

P70EA, P170EA with or without additional suffix numbers

W43A with or without additional suffix numbers

P10BC, *P10BG*, and *P10PA*, with or without additional suffix numbers

P10FC, with or without additional suffix numbers

A19, followed by P or Q, followed by R or S, followed by B or C, with or without additional suffix numbers and/or letters

A28PA or -PJ with or without additional suffix numbers and/or letters

LZGH2.E533907 - Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants | UL Product iQ (ulprospector.com)

PENN Product Group 1

Product Group	Product Category	Design Impact	Certification Scheme	Status
1 Controls using enclosed PENN Switch 	**Temperature Controls** A11, A19/T19, A25, A28	None	LZGH2 UL/EN60335-2-40, CSA C22.2 No. 60335-2-40 Annex JJ Allowable opening to prevent ignition of A2L's	UL Certification Complete
	Pressure Controls P10, P12, P20, P21, P28/P128, P29, P32, P45/P145, P47, P70EA/P170EA, P70SA, P74			
	Flow Controls F261, F262			
	Level Controls F263			

A11

A19

P20

P28

P45

P70

P170

F261

Johnson Controls

U.L. Product iQ Document Portal | LZGH2, Johnson Controls

Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants

COMPANY

SA516

Johnson Controls Inc
507 E Michigan St
Milwaukee, WI 53202-5202 United States

Pressure-operated switches (Single bellows), Model(s): *P77*, f/b A or B, f/b A, C or E, f/b A, B or W, f/b 1, f/b 3, 4, 5, 7 or 8, f/b optional X, f/b optional X, f/b optional X, where X is any number 0 through 9, f/b alpha-character.

Pressure-operated switches (Dual bellows), Model(s): *P78*, f/b L or M, f/b C, G or L, f/b A, B or W, f/b 1, f/b 3, 4, 5, 7 or 8, f/b optional X, f/b optional X, f/b optional X, where X is any number 0 through 9, f/b alpha-character.

Electronic pressure regulating controls, Model(s): *P470EB, P470FB, P545NCA, P545NCB, P545PCA, P545PCB*

Marking: Company name, model designation and the Recognized Component Mark .

Last Updated on 2024-01-05

LZGH2.SA516 - Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants | UL Product iQ (ulprospector.com)

PENN System 450 and A421 Series

Product Group	Product Category	Design Impact	Certification Scheme	Status
2	**Single Function, Adjustable Pressure Controls** P77 Series	None	LZGH2 UL/EN60335-2-40, CSA C22.2 No. 60335-2-40 Annex JJ Allowable opening to prevent ignition of A2L's	UL Certification Complete
2	**Single Function, Adjustable Pressure Controls** P78 Series	None		
4	**Electronic Pressure Controls** P470 Series	None		
4	**Electronic Lube Oil Controls** P545 Series	None		

P77 Series

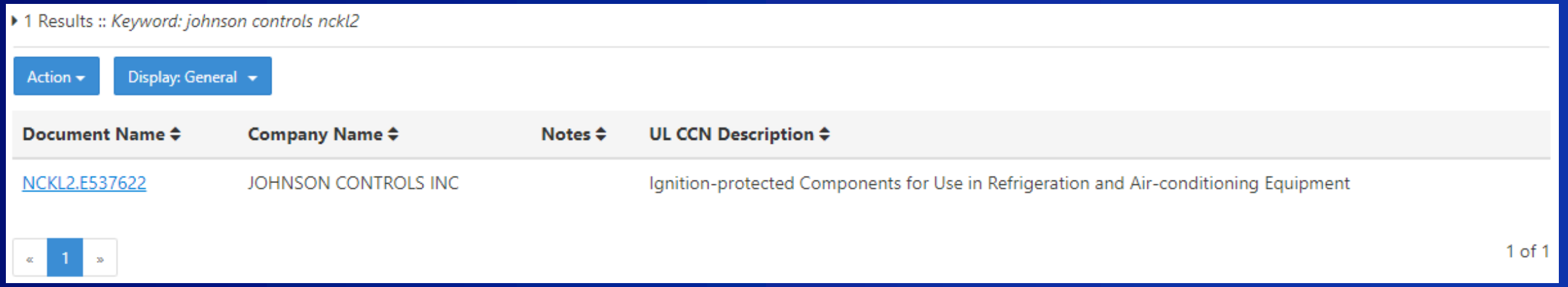
P78 Series

P470 Series

P545 Series

Johnson Controls

U.L. Product iQ Document Portal | Johnson Controls NCKL2



1 Results :: *Keyword: johnson controls nckl2*

Action ▾ Display: General ▾

Document Name	Company Name	Notes	UL CCN Description
NCKL2.E537622	JOHNSON CONTROLS INC		Ignition-protected Components for Use in Refrigeration and Air-conditioning Equipment

« 1 »

1 of 1

LZGH2.E533907 - Flame Arrest-protected Components for Use in Refrigeration and Air-conditioning Equipment Employing A2L Refrigerants | UL Product iQ (ulprospector.com)

U.L. Product iQ Document Portal | Johnson Controls NCKL2

Ignition-protected Components for Use in Refrigeration and Air-conditioning Equipment

COMPANY E537622

Johnson Controls Inc
507 E Michigan St
Milwaukee, WI 53202-5202 United States

Marking: Company name model designation, and the Recognized Component Mark

Note: For additional marking information, refer to the Guide Information Page.

Model(s): *P597RAPS101D, P597RAPS102D, P597RAPS105D, P597RAPS107D, P597RCPA405D, P597RCPA416D, P597RCPS100D, P597RCPS101D, P597RCPS102D, P597RCPS105D, P597RCPS107D, P597RCPS108D, P597RCPS401D, P597RCPS402D, P597RCPS404D, P597RCPS405D, P597RCPS504D, P597RCPS506D, P597RCPS507D, P597RDPS103D, P597RFPS504D, P597RFPS506D, P597RKPS100D, P597RKPS101D, P597RKPS102D, P597RKPS105D, P597RKPS107D, P597RKPS108D, P597RKPS401D, P597RKPS402D, P597RKPS404D, P597RKPS405D*

Model(s): *P599* Followed by A, B, C R, or V, followed by A through H, J, T K S or V, followed by A, C, H, J, P, R, S, T, or U, followed by A or S, followed by XX where X can be alphanumeric, followed by XXX, where X is any number, followed by C, D or K, may be followed by X, where X is any alphanumeric.

P266, Model(s): *P266AAA* followed by -, followed by additional number or letters.

P266, Model(s): *P266ABA* followed by -, followed by additional number or letters.

P266, Model(s): *P266ACA* followed by -, followed by additional number or letters.

P266, Model(s): *P266ADA* followed by -, followed by additional number or letters.

P266, Model(s): *P266BCA* followed by -, followed by additional number or letters.

P266, Model(s): *P266BDA* followed by -, followed by additional number or letters.

P266, Model(s): *P266BGA* followed by -, followed by additional number or letters.

P266, Model(s): *P266BHA* followed by -, followed by additional number or letters.

P266, Model(s): *P266CHA* followed by -, followed by additional number or letters.

P266, Model(s): *P266EAA* followed by -, followed by additional number or letters.

P266, Model(s): *P266EBA* followed by -, followed by additional number or letters.

P266, Model(s): *P266ECA* followed by -, followed by additional number or letters.

P266, Model(s): *P266EDA* followed by -, followed by additional number or letters.

P266, Model(s): *P266EEA* followed by -, followed by additional number or letters.

P266, Model(s): *P266EFA* followed by -, followed by additional number or letters.

PENN P597, P599 and P266 Series

Product Group	Product Category	Design Impact	Certification Scheme	Status
5	**Pressure Transducers** P597 and P599 Series	None	NCKL2/8 UL File no. E537622	UL Certification Complete
6	**Electronic Fan Speed Controllers** P266 Series	None		

P597 Series

P599 Series

P266 Series

Johnson Controls

Johnson Controls

PENN

System 550

GM Series
Refrigerant Leak Sensor

The power behind **your mission**

C550 Control Module – Features and Functions

- C550 Control Module will include **temperature, humidity and pressure control** (relay or analog outputs) plus **A2L refrigerant leak detection and mitigation** functionality as required by UL Standards 60335-2-40 and 60335-2-89.
- A2L mitigation will energize/de-energize specified C550 relays if one or more of the A2L sensors detects a concentration of refrigerant that is equal to 25% of the refrigerant's Lower Flammability Limit. Via the C550 menu, you have the option to alarm and/or mitigate at a level lower. **Up to six (6) A2L sensors can be connected to one (1) C550 controller.**
- A2L mitigation will also **energize specified C550 relays** if a fault is sensed in one (1) or more of the A2L sensors.
- As part of the mitigation process, the **controller is locked-out for a minimum of 5 minutes and must be manually reset**.
- C550 control modules will include a USB port to allow **config files to be uploaded from a PC to additional C550 control modules** without having to power the device.
- In addition to the two (2) relay outputs, the C550 control module will also be equipped with a **0-10VDC analog output** to provide **LFL** information to a system controller. Based on the reported LFL level, the system controller can send out alarms (audible or via SMS text and/or email).
- The C550 control module will also include a **"Test Mode"** so that customers can confirm that mitigation functionality is working as designed.
- All C550 control modules will include a **Cloud Connectivity option**, allowing for **two-way communications with the device**. Service technicians will be able to receive **SMS Text and/or Email alarms**, as well as **check control set-points, defrost schedules and sensor values.**

A2L Refrigerant Leak Sensor

Specifications

- Complies with UL60335-2-40 ed. 3 and UL60335-2-89 ed. 1
- Works with A2L refrigerants (R454A, R454B, R454C, R455A, R1234yf and R32)
- LFL range: 0 to 100%
- Working temperature: -40F to +185F (-40C to +85C)
- Working humidity: 0 to 100% RH, condensing
- Working pressure: 10 psi to 17 psi (70 kPa to 120 kPa)
- Protection: IP54 (EN 60529)
- Low power: <40mA

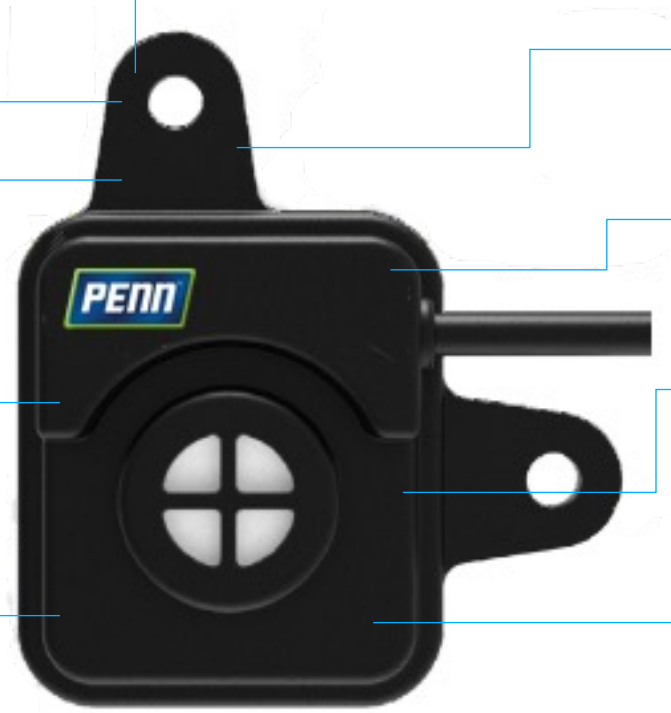
Longevity
15+ years, to withstand the extended lifetime of HVACR equipment.

No Calibration Needed
Factory calibrated sensor that does not require field calibration or re-zeroing during its lifetime.

Various Output Options
Analog, Modbus (RS485 or UART), PWM and Relay outputs available.

Embedded Self-Diagnostics
Sensor self-diagnostics performed once per minute providing any fault alarms.

Highly Accurate
Temperature and humidity compensation sensors present for high accuracy regardless of the environmental conditions.



Fast Response Time
Fast response (T25 < 7 sec) and warm-up time (<5 sec) to comply with international standards.

No False Positives
No false positives from fouling gases as required by international standards.

Immune to Poisoning
Immune to sensor degradation even with continuous poisoning.

Mechanical and Environmental Robustness
Robust package that performs flawlessly given the environmental conditions and requirements for commercial HVACR equipment.

Johnson Controls

Questions?

Appendix

F-Gas Bans – New Stationary Refrigeration Equipment

2025

- **Ban on Refrigeration equipment except chillers and other mentioned below F-Gases with a GWP of 2500 or more**, except equipment intended for applications designed to cool products to temperatures below -50C (-58F).
- **Refrigerators and freezers for commercial use (self-contained equipment) that contain other F-Gases with a GWP of 150 or more.**
- **Any self-contained refrigeration equipment, except chillers, that contains F-Gases with a GWP of 150 or more,** except when required to meet safety requirements.

2026

- **Domestic refrigerators and freezers that contain F-Gases,** except when required to meet safety requirements.

2027

- **A ban on new equipment (excludes chillers) using F-Gases with a GWP of 150 or more**, except when required to meet safety requirements.

Johnson Controls

F-Gas Bans – New Stationary Refrigeration Equipment

2027

- **Plug-in room, monobloc air conditioning and other self-contained heat pump equipment, with a maximum rated capacity of up to and including 12kW (41000 Btuh) that contain F-Gases with a GWP of 150 or more, except when required to meet safety requirements.** When safety requirements at the site of installation would not allow using alternatives to fluorinated greenhouse gases with GWP of 150 or less, the GWP limit is 750.

- **Monobloc and other self-contained air conditioning and heat pump equipment, with a maximum rated capacity of larger than 12kW (41000 Btuh) but not exceeding 50kW (170600 Btuh) that contain F-Gases with a GWP of 150 or more,** except when required to meet safety requirements. Same GWP limit of 750 as noted above.

2030

- **Other self-contained air conditioning and heat pump equipment that contains F-Gases with a GWP of 150 or more, except when required to meet safety requirements.** When safety requirements at the site of installation would not allow using alternatives to fluorinated greenhouse gases with GWP of 150 or less, the GWP limit is 750.

2032

- **Plug-in room, monobloc air conditioning and other self-contained heat pump equipment, with a maximum rated capacity of up to and including 12kW (41000 Btuh) that contain F-Gases, except when required to meet safety requirements.** When safety requirements at the site of installation would not allow using alternatives to fluorinated greenhouse gases with GWP of 150 or less, the GWP limit is 750.

Johnson Controls

F-Gas Bans – New Stationary Refrigeration Equipment

2027

- **Ban on the use of F-Gases with a GWP of 150 or more for chillers up to and including a rated capacity of 12kW (41000 Btuh),** except when required to meet safety requirements.
- **Ban on F-Gases with a GWP of 750 for new chillers above 12kW (41000 Btuh),** except when required to meet safety requirements.

2032

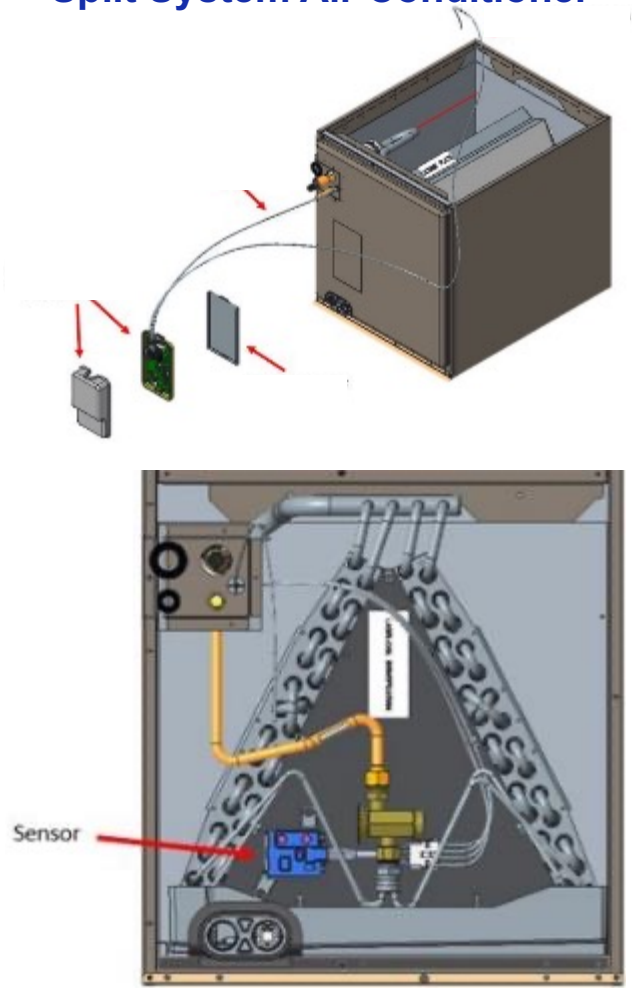
- **A total ban of F-Gases for new chillers up to and including a rated capacity of 12kW (41000 Btuh)**, except when required to meet safety requirements.

Johnson Controls

HVAC Equipment using A2L Refrigerants; Production Launch and Refrigerant Leak Detection Systems

- **A2L Products will begin entering the market "in mass" by summer / fall 2024**
  - **1/1/2025: "no later than" date**
- **RLDS can be factory mounted or field installed – location pre-determined**
- **"Generic" RLDS "kits" not allowed**
- **All RLDS will be listed by a safety agency for the specific units to which they are applied**
  - **Per UL 60335-2-40, ASHRAE 15 & 15.2**
- **RLDS not required in all applications**
  - **Below LFL - large zones / small charges**
  - **Below minimum's charge size (< 4 lbs.)**
  - **Constant Airflow above minimum cfm**

Split System Air Conditioner



Packaged Air Conditioner

RDS function is to turn on the blower to dilute any leak from reaching the LFL

Johnson Controls