Honeywell Home

Resideo Zoning Solution for New A2L Refrigerant Requirements

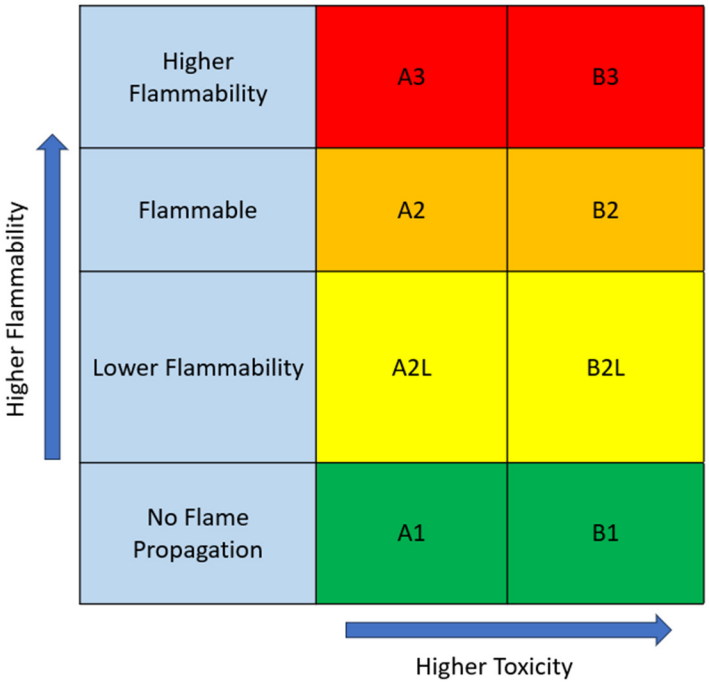
Why was this regulation put into place?

The American Innovation and Manufacturing Act of 2020 (AIM Act) was enacted on December 27, 2020. The AIM Act mandates the phasedown of HFCs (hydrofluorocarbons) by 85 percent from historic baseline levels by 2036 and authorizes EPA to address HFCs. In pursuit of this goal, the EPA's latest regulation includes the banning of chemicals with a global warming potential of 700 or greater. R410A one of the most common general HVAC refrigerants and is included in the ban. This phase down requires air conditioner and heat pump manufacturers to move to lower global warming potential refrigerants no later than January 1, 2025. One option for replacement refrigerants includes chemicals classified by ISO 817 as A2L.

What is A2L?

A2L is a refrigerant classification that indicates the flammability and toxicity of a refrigerant. Refrigerant classifications range from A1 (lowest toxicity, not flammable) to B3 (higher toxicity, higher flammability). Many manufacturers will be transitioning their equipment from R410A (A1) to either R454B or R32 (A2L).

Due to the increased flammability of the A2L chemicals compared to legacy HFCs, additional safety requirements need to be implemented for the specific uses of the A2L chemicals. IEC 60335-2-40 and the companion UL 60335-2-40 describe the safety requirements for electrical heat pumps and air conditioners.



Class 3 Requirements

1. Exhibit flame propagation @ 60C & 101.3 kPA
2. LFL ≤ 0.10 kg/m³ or HOC ≥ 19,000 kJ/kg

Class 2 Requirements

1. Exhibit flame propagation @ 60C & 101.3 kPA
2. LFL > 0.10 kg/m³
3. HOC < 19,000 kJ/kg

Class 2L Requirements

1. Exhibit flame propagation @ 60C & 101.3 kPA
2. LFL > 0.10 kg/m³
3. HOC < 19,000 kJ/kg
4. S_f ≤ 10 cm/s

Class 1 Requirements

1. No flame propagation @ 60C & 101.3 kPA

LFL – lower flammability limit. Minimum concentration required for combustion
HOC – heat of combustion
S_f – flame speed

What does the new A2L regulation require of furnaces and air handlers?

IEC/UL 60335-2-40 includes many different methods and requirements to ensure safe operation of heat pumps and air conditioners and requires manufactures to comply with the requirements of the standard.

For A2L applications IEC/UL 60335-2-40 requires furnace and air handler manufacturers to include an onboard refrigerant leak detection system. If the leak detection system is activated, the following must occur for at least five minutes until the leak detection system is reset:

- Energize the fan of the appliance.
- Disable compressor operation.
- Energize control signals to open any external zoning dampers *if applicable*.

How do we interpret the new regulation in a zoning application?

IEC/UL 60335-2-40 requires heat pump and air conditioner manufacturers to declare an A_{min} minimum room area or TA_{min} minimum room area of conditioned space and include this minimum area in their documentation. This area is the minimum area required to safely operate this equipment. TA_{min} is calculated by adding up the total conditioned area (sq m or sq ft) that is connected by the ducting system.

For homes without a zone control system, TA_{min} is compared to the total conditioned square footage. For homes with a zone control system, TA_{min} is compared to the minimum air conditioned room area plus the area of the room in which the appliance is installed. Honeywell Home zone panels will always leave one zone damper open, even in an idle state, so the minimum air conditioned room area is equal to the area of the smallest zone.

The manufacturer's declared TA_{min} is sometimes presented in a chart or graph with modifiers for altitude, amount of charge, other system configurations, and variables.

If the leak detection system detects refrigerant do all zone dampers need to open?

The standard requires all zone dampers to open only if the minimum air conditioned room area plus the area of the room in which the appliance is installed is less than the manufacturer's declared TA_{min}. If that square footage is greater than the manufacturer's declared TA_{min}, no further actions are required. Below is an example of a chart found in the installation instructions of an OEM's appliance. Using this chart, a 5-ton system has an TA_{min} of 224 square feet. Please consult your appliance's installation instructions for the TAmin to be used for your calculations.

Coil Mitigation Chart				
Model	Minimum Air Conditioned Room Area (m^2)	Minimum Air Conditioned Room Area (ft^2)	Minimum Mitigation Airflow (m^3/hr)	Minimum Mitigation Airflow (CFM)
1.5 Ton	13.3	143	437	257
2.0 Ton	13.5	145	445	262
2.5 Ton	14.5	155	477	281
3.0 Ton	17.3	185	570	335
3.5 Ton	18.9	203	624	367
4.0 Ton	20.3	219	671	395
5.0 Ton	20.9	224	689	405

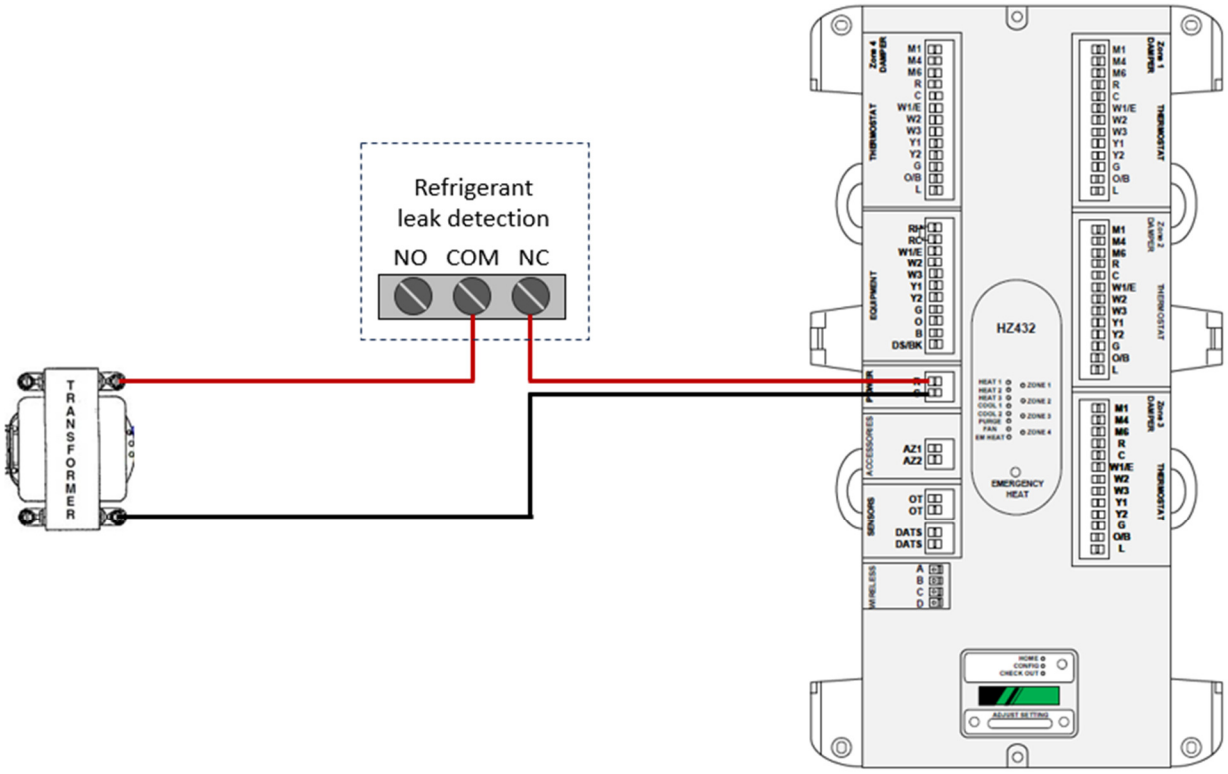
Sample Calculations				
System Capacity	**TA_{min}**	**Smallest Zone (sq ft)**	**Equipment Room (sq ft)**	**Zoning Mitigation Required?**
2.0T	145	200	60	No
2.0T	145	100	20	Yes
3.0T	185	250	100	No
3.0T	185	200	50	No
5.0T	224	300	100	No
5.0T	224	150	50	Yes

Why does the Standard (IEC/UL 60335-2-40) leave some room for interpretation?

The Standard (IEC/UL 60335-2-40) is a safety standard for electrical heat pumps and air conditioners, and it leaves room for interpretation to future proof it as much as possible. While R32 and R454B have relatively small A_{min}, other refrigerants that may be used in the future could have larger A_{min} and make mitigation more common.

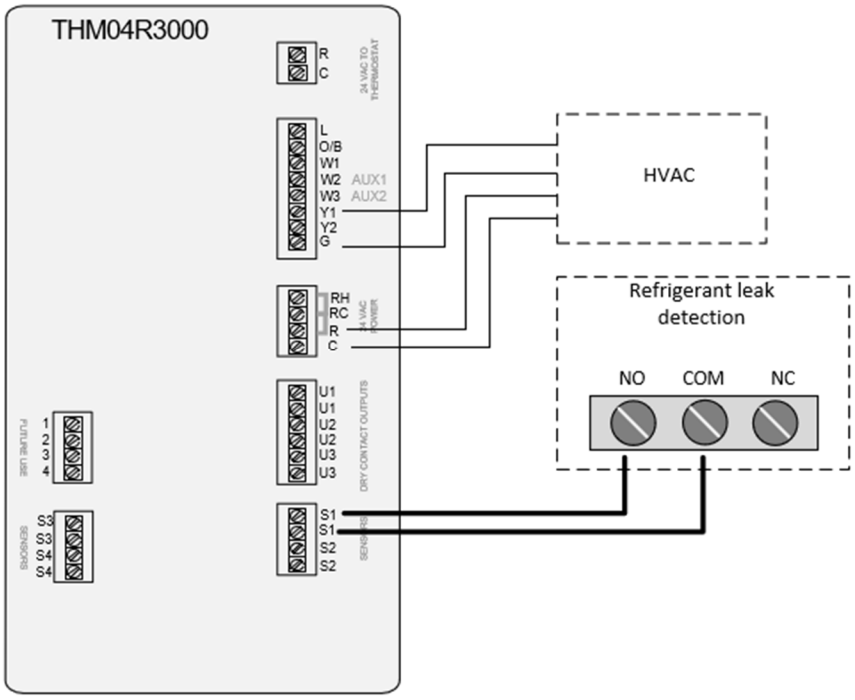
What are the options with Honeywell Home zone panels if zoning mitigation is required?

If zoning mitigation is required based on either the TA_{min} calculation or the manufacturer's recommendation, the installer can run power to the zone panel through the A2L sensor in the appliance. Honeywell Home ARD and ZD dampers are spring open/power close so if power is removed from the zone panel, all dampers will open.



Refrigerant leak alert on Smart thermostat for single-zone applications.

For a single-zone application the Normally-open, Normally-closed, and COM terminals on the Refrigerant leak detection board would *not* go to a zone panel. They could instead go to any set of S terminals on the EIM included in the Honeywell Home YTHM1004 kits with T10+ Smart thermostat and EIM. The T10+ with EIM can be configured for a custom dry contact alert message. (diagram below).



How does this get enforced on an installation?

Compliance is checked by inspection. The inspector will refer to the installation manual of the appliance to determine if the installation meets local code.

Resideo Technologies, Inc.
Scottdale, Arizona 85254

www.resideo.com 33-00723-01 4-25