***Prohibitions on Use of Certain Hydrofluorocarbons in Stationary Refrigeration, Stationary Air-conditioning, and Other End-Uses.***

Application for a Variance from the requirements of California Code of Regulations, Title 17, sections 95374 and 95375.

*Note: the requirements for a variance application are listed in California Code of Regulations, Title 17, section 95378, Use of this application* template is optional.

A. Name of applicant: AboveAir Technologies, LLC

Ownership status (e.g., parent, subsidiary): Subsidiary of AirX Climate Solutions

Address: 5179 Mountville Road, Frederick, MD 21703

Telephone number: 301-874-1130

E-mail address: mrice@aboveair.com

B. Please describe your business activity or product description.

AboveAir Technologies (AAT) is a Maryland-based manufacturer of air conditioning equipment intended for computer and data processing environments. High uptime is a basic requirement for these applications; under the five 9's concept, a data center is expected to be available 99.999% of the time. This allows for a downtime of merely 5 minutes and 15 seconds per year. These are critical applications for HVAC equipment. The equipment must be designed to ensure proper temperature and humidity control for the optimal operation of electronic equipment high load density environment. Equipment failure or downtime, like that of the data center, is not tolerated.

AAT offers a variety of configurations to meet the needs of the facility, including parameter units, floor consoles, wall-mounted units, and ceiling-mounted units. In addition to supplying standard configurations for new work, AAT offers more airflow options and unit configurations than any of its competitors. The variety of airflow patterns and unit configurations allows facilities to replace obsolete equipment with newer, more efficient equipment.

C. Please describe your relationship to the product.

AAT is the original equipment manufacturer of the product. The product is sold through a network of manufacturers' representatives.

D. List the specific section(s) of the regulation from which a variance is being requested.

Cal. Code Regs. Tit. 17, § 95374 - List of Prohibited Substances, Table 3: End-Use and Prohibited Substances Air-conditioning Equipment (Other air-conditioning (new)

equipment, residential and non-residential) and the related requirements in Cal. Code Regs. Tit. 17, § 95375 - Prohibitions, Exceptions, Registration, Recordkeeping, Reporting, Labeling, and Disclaimer Requirements

E. Provide an explanation and description of the reasons for seeking a variance.

*Please note that information deemed confidential is highlighted in yellow below.*

AAT seeks a temporary variance to continue the use of R-410A in its computer and data processing air conditioning equipment through January 1, 2027.

It has been impossible for AAT to complete its transition away from R-410A as of January 1, 2025, due to a variety of factors. When AAT first began researching the transition requirements, there was considerable concern about the availability of parts and building codes keeping up with new requirements for A2L refrigerants. We began making inquiries of our vendors for part availability, but little information was available. This was compounded by pandemic related disruptions in supply chains. In May of 2021, the AAT engineering team determined that the best path forward would be to move to R-454B refrigerant following the announcements of larger HVAC manufacturers including Carrier and Johnson Controls. AAT believed that these larger companies would drive the supply chain and ensure broader component availability.

AAT's equipment falls under CARB's Air-Conditioning Equipment – Other air-conditioning equipment, residential and non-residential category prohibiting refrigerant with a GWP of 750 or greater as of January 1, 2025. 17 CCR § 95373. The regulatory process did inject some uncertainty into the compliance process for IT equipment; proposals existed to impose more stringent GWP limitations on the sector existed.

On October 24, 2023 the EPA published the final rule establishing the Technology Transitions program separating data center, ITE, and computer room equipment as a separate sub-sector and establishing a 700 GWP limit. This rule eliminated near-term uncertainty. 40 CFR 84.54(a)(11), 40 CFR 84.54(c)(13).

Even with the GWP requirements adopted by California and the U.S. EPA, the path to compliance imposes some unique challenges for the IT sector and A2L refrigerants. Standard practice for CRAC units involves installing the compressors within the conditioned space (in the airstream of the CRAC unit in smaller capacity units or in separate compressor compartments in larger units) and in redundant configurations. The units must supply constant cooling to very dense sensible loads, while meeting stringent requirements for up-time.

The compliance path of UL 60335-2-40, Third Addition, Annex GG, imposed refrigerant limitations and mitigation requirements that would make it difficult to comply both with California regulation and the safety requirements of UL 60335-2-40 while meeting the

performance requirements of the IT sector. UL 60335-2-40, fourth edition, was adopted as of December 15, 2022. This update introduced Annex 101.DVN which imposed additional requirements for Information Technology Equipment (ITE) and spaces utilizing A2L refrigerants. This annex added new requirements for networked mitigation response, charge limitations, and volume limitations for the unique requirements of this sector but creates new hurdles for compliance with system controls.

Despite uncertainty in rule-making, AAT continued to pursue R-454B as a replacement refrigerant for R-410A beginning in 2021. It was thought that being able to offer both refrigerants would be a competitive advantage as specifying engineers were already requesting alternatives to R-410A as early as 2021. AAT's early requests to vendors were frequently rebuffed. [redacted] At that time, many vendors would not work with AAT due to the low volume; this impacted sourcing new components like refrigerant detection sensors for mitigation operations. Other vendors had not begun their own transitions to A2L refrigerants or did not have test samples ready.

[redacted] was unable to deliver sample compressors for testing in a timely fashion. The original timetable provided to us indicated production for compressors would begin in 2023. We did not receive pricing for our initial test samples until April 2024. We received formal marketing launch bulletins from [redacted] for their A2L compressors in November 2024. We also finally received 3D models, compressor coefficients, and full cut sheets in November 2024.

AAT has seen similar delays from its coil manufacturers. [redacted] introduced its design software for R-454B coils in 2024. We were warned by our contact that there were some issues with it, and it was briefly pulled from their selection platform before being re-introduced. [redacted] AAT's primary coil manufacturer, did not provide coil selection information until November 2024. AAT is in the process of redesigning all coils for R-454B based on this new information. While performance is generally similar to R-410A, there are greater areas of instability in coil performance which require adjustments to the coils.

Supplier delays have been compounded by the pressure on NRTLs (Nationally Recognized Testing Laboratories). AAT finalized the test samples to be built for UL 60335-2-40 testing with [redacted] in March 2024 with a target test date in September 2024. This date has been pushed back repeatedly due to their lab loading; AAT is currently looking at a test date in mid-July 2025 and does not expect a finalized report until August or September based on feedback from other manufacturers if this test date holds.

AAT anticipates scheduling performance testing and completing efficiency information after confirming that the equipment satisfies the requirements of UL 60335-2-40. AAT has historically relied on these same test labs for performance testing equipment. Unfortunately, we did not anticipate how heavily loaded 3rd party labs would be during this transition. With all HVAC manufacturers attempting to schedule lab space to comply with the new UL code and new refrigerants, AAT has opted to build its own psychrometric testing room for all testing moving forward. We are awaiting final design and pricing information so that we can move forward with this.

The consulting engineers specifying this equipment are also having difficulty addressing these new requirements. With the federal government delaying the refrigerant transition for these applications until January 1, 2027, official design guidance has also been slow. Some of the mitigation requirements will not be finalized until UL 60335-2-40 testing has been completed. And these applications are typically normally unoccupied spaces with minimal ventilation requirements and dense cooling loads. Mitigation requirements and ASHRAE 15 requirements for A2L refrigerants have historically not been addressed in computer rooms and may require additional ventilation systems or architectural changes.

F. Identify what type of variance is being requested:

☒ Impossibility (the Applicant exercised best efforts but still was unable to comply with the regulatory requirements of the regulation for reasons beyond his or her control despite exercising foresight to prevent the noncompliance.)

☐ Force Majeure Event (a sudden and unforeseeable event involving a clear danger, demanding action to prevent or mitigate the loss of, or damage to, life, health, property, or essential public services, arising from causes beyond the control of the Applicant, which delays or prevents the performance of any obligation under the regulation, despite the Applicant's best efforts to fulfill the obligation. This includes events where the local government, State of California, or federal government issues a declaration of emergency, such as war, wildfires, floods, hurricanes, tornadoes, earthquakes, volcanic eruptions, and pandemics. This does not include negligent acts or the Applicant's financial inability to perform that is unrelated to an event as defined in this section.)

☐ Both Impossibility and Force Majeure Event

G. If seeking an Impossibility variance please provide clear and convincing evidence demonstrating how all of the following Impossibility variance criteria have been met:

1. A lower risk substitute is not currently or potentially available.

AAT units are currently certified by Intertek/ETL to conform to the safety requirements of UL 1995 revision 5. There is currently no acceptable substitute within the scope of UL 1995. AAT cannot ship A2L equipment with lower GWP until UL 60335-2-40 testing is completed because UL 1995 did not cover these refrigerants.

2. An exemption will not increase the overall risk to human health or the environment.

R-410A has been one of the preferred refrigerants for these applications since 2013. It poses no additional risk to human health beyond that baseline. R-410A does pose an environmental risk due to its GWP of 2,088. AAT will seek to offset this risk through the purchase of carbon credits, described herein.

3. The Applicant has used best efforts to anticipate and address the impossibility and any potential noncompliance.

Yes, AAT has earnestly pursued a transition to R-454B, as described in response E. AAT had hoped to be the first manufacturer in its sector to make R-454B equipment available but unfortunately supply chains and NRTL availability stymied these efforts.

H. If seeking a Force Majeure Event variance please provide clear and convincing evidence demonstrating how all of the following Force Majeure variance criteria has been met:

1. Non-compliance is due to a Force Majeure event.

N/A

2. The Applicant has used best efforts to anticipate and address any force majeure event and any potential noncompliance, including minimizing any adverse effects of the greenhouse gas emissions related to noncompliance.

N/A

I. Please attach supporting documentation for attributing noncompliance to Impossibility or a Force Majeure Event. Supporting documentation must be written in English. Please list the supporting documentation that is attached to this application.

1. Email demonstrating efforts to secure testing with testing laboratory.
   a. [redacted]
2. Information showing A2L launch from AAT's primary compressor manufacturer with dates demonstrating first contact to final commercial release of the compressor lines.
   a. [redacted]
3. Email showing primary coil manufacturer's selection software release.
   a. [redacted]

4. Table of 2024 DX units sold in California with system charges to substantiate sales estimates.
    a. [redacted]
5. Product manuals for the equipment to be covered under this variance.
    a. HK.pdf
    b. MC1.pdf
    c. MC2DX.pdf
    d. MC2x2.pdf

J. Provide a description of all efforts made to timely fulfill the requirements of the section(s) from which a variance is being requested.

Please refer to responses E, G, and the documentation provided in I for these details.

K. Please provide the length of the variance requested as well as the earliest date when compliance will be achieved.

AboveAir Technologies requests a variance through January 1, 2027. AAT is hopeful that this date can be accelerated, however, any efforts to accelerate this process are reliant upon loading at 3rd party NRTL facilities.

L. Provide a compliance plan which describes in detail how, if a variance is granted, compliance will be achieved as expeditiously as possible including all of the following:

(i) The method by which compliance will be achieved

AAT will continue to devote its engineering resources to moving its product lines to R-454B refrigerant and cease offering R-410A product as soon as possible.

(ii) Milestone dates

Please refer to the Low GWP transition table & GANNT chart at the end of this document for more detail for more detail.

- UL 60335-2-40 Testing – July 2025
- Efficiency filings – Q1 & Q2 2026
- Operations transitions – Q1 through Q3 2026

(iii) Milestone achievements

Please refer to the Low GWP table & GANNT chart at the end of this document for more detail.

- Listed under UL 60335-2-40. Equipment will meet the safety regulations required for installation.
- Efficiency filing with the Federal government. Equipment will be listed and meet the minimum efficiency standards required by regulation.

- Elimination of R-410A inventory.

M. Provide a description of the damage or harm that will result to the Applicant from immediate compliance with the regulatory requirements, including if compliance would result in an extraordinary economic hardship, such as closure of the entire facility or loss of a large portion or the revenue:

*Please note that information deemed confidential is highlighted in yellow below.*

Immediate compliance with the regulatory requirements would require AAT to withdraw from the California market. Since entering the California market, AAT has seen its shipments increase from [redacted]. There would be significant risk for AAT's manufacturers' representatives in California as well; they would lose an important product in their portfolio and be at a competitive disadvantage when attempting to bid for projects. There may also be a negative impact on data center and computer room customers; demand is currently extremely high for this product, losing a supplier from the market may result in longer lead times, reduced choice in product, and less leverage in negotiating pricing for equipment.

N. If applying for an Impossibility variance please provide quantification of current Greenhouse Gas (GHG) emissions resulting from normal business-as-usual operations as it directly relates to the continued use of any substance in end-uses listed in Table 1, section 95374 (a); Table 2, section 95374 (b); Table 3, section 95374 (c); or Table 4, section 95374 (d). This includes quantification of the direct GHG emissions resulting from refrigerant leaks or HFC emissions and indirect GHG emissions resulting from energy use (where applicable), with all calculations, based on the average lifetime of the equipment or product that will continue to use prohibited substances. Applicant must include all calculations used to calculate GHG emissions estimates, including emission factors (i.e., charge size as defined in section 95373, leak rate as defined in *40 C.F.R. Part 82.152*, and refrigerant used over the average lifetime of the equipment, system, or product). Please see the bottom of this application template for an example calculation.

AAT offers a variety of sizes of equipment, from 1-ton (11 kW) through 30-tons (105 kW). The California market has primarily purchased equipment from two model families, the HK (ceiling mounted mission critical AC units) and MC (floor-mounted parameter mission critical AC units). These units are designated as follows:

- Packaged Air-Cooled: HKA-XXXS1 / HKA-XXXS1
- Water-Cooled or Glycol-Cooled: HKW/G-XXXS1 / HKW/G-XXXD1 or MCW/G-XXXS1 / MCW/G-XXXD1
- Split Air-Cooled: HKE/H-XXXS1 / HKE/H-XXXD1 or MCE/H-XXXS1 / MCE/H-XXXD1

XXX is a placeholder for the unit's nominal capacity in kW. S1 indicates the unit is a single circuit R-410A system. D1 indicates the unit is a dual circuit R-410A system.

Using 2024 as a baseline, AAT projects a 50% increase in units sold in 2025 and 2026.

| | Model Family HKA | Model Families HKW/G & MCW/G | Model Families HKE/H & MCE/H |
|---|---|---|---|
| [redacted] | | | |

AAT calculated an average charge for each configuration of equipment sold in California in 2024, as shown in the table below. Split systems include the refrigerant charge assuming the contractor installs a maximum of 200 linear feet of refrigerant piping.

| | Model Family HKA | Model Families HKW/G & MCW/G | Model Families HKE/H & MCE/H |
|---|---|---|---|
| [redacted] | | | |
| Lifetime (years) | 15 | 15 | 15 |
| Average Annual Leak Rate (%) | 10 | 10 | 10 |
| Average End-of-Life Leak Rate (%) | 56 | 56 | 56 |
| Total Annual Emittance over Lifetime (lbs.) | 1,275.0 | 682.5 | 16,039.8 |
| Total EOL Emittance (lbs.) | 476.0 | 254.8 | 5,988.2 |
| Lifetime Leakage (lbs.) | 1,751.0 | 937.3 | 22,028.0 |
| Lifetime Leakage, Total All Configurations (lbs.) | 24,716.3 | | |
| GWP R-410A | 2088 | | |
| R-410A CO2e (lbs.) | 51,607,617.7 | | |
| R-410A CO2e (Metric Tons) | 23,408.8 | | |
| GWP R-454B | 466 | | |
| R-454B CO2E (lbs.) | 11,517,792.1 | | |
| R-454B CO2e (Metric Tons) | 5,224.4 | | |
| Total Required Offset (Metric Tons) | 18,184.5 | | |

For this evaluation, AAT used the Unitary AC ≤ 22.7 kg (50lbs. or less) (central) data from California's High Global Warming Potential Gases Emission Inventory, Emission Inventory Methodology and Technical Support Document, 2015 Edition and an assumed service life of 15 years for computer room equipment. AAT believes this offers a worst-case estimate; because these are mission critical applications, end-users tend to be much more compliant with preventative maintenance schedules and attentive to any system disruptions.

O. Provide a description of any negative impacts to human health or the environment that may result from the granting of a variance.

R-410A has been one of the preferred refrigerants for these applications since 2013. It poses no additional risk to human health beyond that baseline. R-410A does pose an environmental risk due to its GWP of 2,088. AAT will seek to offset this risk through the purchase of carbon credits, described herein.

P. Provide a mitigation plan that demonstrates how you will reduce excess GHG emissions to a level equal to or below what would have been emitted had you been in compliance and how

you will mitigate any negative impacts to human health or the environment. You must include all calculationsused to calculate GHG emission estimates including emission factors (i.e., charge size as defined in section 95373, leak rate as defined in *40 C.F.R. Part 82.152*, and refrigerant used over the average lifetime of the equipment, system, or product). This may include an analysis of prohibited substances, efforts to reduce leaks or venting of prohibited substances, and options to recycle or destroy high-Global Warming Potential refrigerants.

*Please note that information deemed confidential is highlighted in yellow below.*

AAT will purchase a quantity of carbon offsets equal to 18,185 $CO_2$-equivalent tons for the variance period from a reputable provider within 90 days of being granted a variance.

Q. Provide a detailed explanation of efforts that may be implemented to curtail noncompliance in lieu of obtaining a variance

AAT has made every effort to accelerate the transition to R-454B as our refrigerant of choice. Unfortunately, AAT is reliant on 3rd party laboratory testing to certify compliance with UL-60335-2-40, to verify performance, and to complete energy efficiency ratings of our equipment. NRTL resources have been stretched thin with this transition and AAT's test dates have been repeatedly pushed back. Data center and computer room products have been considered lower priority due to the federal variance through January 1, 2027. Without this testing, our equipment cannot be installed within buildings. AAT would be forced to cease all operations in California for up to two years while the certification process for the R-454B product is completed.

R. By signing below, you (the Applicant) certify under penalty of perjury that you are a Responsible Official with full authority to submit the application and implement any provision of an Executive Order, and that all information provided is true and accurate to the best of your knowledge, after conducting due diligence. (Applications without this certification will be automatically denied.)

Signature Michael Rice Date 6/13/2025

S. Submit your application and documentation relating to the variance to CARB at the following email address:

*HFCREDUCTION@ARB.CA.GOV*

T. Any Applicant submitting information to the Executive Officer You may claim information as "confidential" by clearly identifying it as "confidential." Any claim of confidentiality must be based on your belief that the information marked as confidential is either trade secret or otherwise exempt from public disclosure under the California Public Records Act (*Government Code, section 6250 et seq*.). All such requests for confidentiality shall be handled in accordance

with the procedures specified in *California Code of Regulations, title 17, sections 91000 to 91022*.

**Example Emission Calculation**

Company X will produce 200 vending machines, and each machine will include 0.7 lbs. of HFC-134a. The average annual leak rate is 0.3%, and the average loss rate at end-of-life is 98.5%. The average lifetime is 15 years. The IPCC AR4, 100-year GWP value for HFC-134a is 1,430. Emission factors were obtained from *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2018/casnap/isorappb.pdf*.

Average annual leak rate emissions

200 vending machines x 0.7 lbs x 0.3% x 1,430 GWP x 15 years = 9,009 lbs. $CO_{2e}$

End-of-Life emissions

200 vending machines x 0.7 lbs x 98.5% x 1,430 GWP = 197,197 lbs. $CO_{2e}$

Total emissions

197,197 lbs. $CO_{2e}$ + 9,009 lbs. $CO_{2e}$ = 206,206 lbs. $CO_{2e}$

Convert to metric tons

1 metric ton = 2204.62 lbs.

206,206 lbs.$CO_{23}$/2204.62 lbs = 93.53 $MTCO_{2e}$

# Task List

smartsheet

| | Task Name | Start Date | End Date | Done | Comments |
|---|---|---|---|---|---|
| 1 | UL 60335-2-40 Certification | | | | |
| 2 | Update component listing | 08/05/24 | 07/14/25 | | Continuing to update with R-454B parts as they are listed. Filed to be submitted at time of test. |
| 3 | Build UL 60335-2-40 Test Units | 08/05/24 | 04/30/26 | | Unit build repeatedly delayed due to changing ETL test dates and requirements. |
| 4 | UL 60335-2-40 Test | 07/14/25 | 09/15/25 | | End date based on feedback from other manufacturers receiving final certification. |
| 5 | Update product IOM manual | 08/05/24 | 09/15/25 | | Final manual updates to be verified with ETL certification |
| 6 | Performance and Efficiency Data | | | | |
| 7 | Coil redesign | 11/08/24 | 07/31/25 | | Began with release of Cancoil selection tools |
| 8 | Preliminary calculated efficiency data | 05/05/25 | 07/31/25 | | Latest R&R-KCC program updated to include all available Copeland R-454B compressors |
| 9 | Performance validation units | 10/01/25 | 12/31/25 | | Performance validation units to be worked into Q4 production schedule |
| 10 | Performance testing | 01/01/26 | 04/01/26 | | Complete performance testing - NRTL or AAT lab TBD - prioritize HK and MC product for CARB compliance |
| 11 | Adjust models based on performance testing | 04/01/25 | 05/01/25 | | Update R&R-KCC models for selection software |
| 12 | File efficiency data with government agencies | 01/01/26 | 06/01/26 | | File data as product line testing is completed |
| 13 | Update manuals with R-454B data | 01/01/26 | 06/01/26 | | Manuals to be updated on rolling basis, prioritizing HK and MC product for CARB compliance |
| 14 | Operations | | | | |
| 15 | Transition to R-454B rated refrigeration specialties | 07/01/25 | 07/01/26 | | Cease purchase of R-410A specific specialties by Q2 2026 |
| 16 | Transition coil inventory to new R-454B coils | 01/01/26 | 10/01/26 | | HK and MC to be prioritized and R-454B to be prioritized for California market/CARB compliance |
| 17 | Transition compressor inventory to R-454B models | 01/01/26 | 10/01/26 | | HK and MC to be prioritized and R-454B to be prioritized for California market/CARB compliance |
| 18 | Final day to manufacture R-410A | 12/31/26 | 12/31/26 | | Final day to complete any R-410A orders for data center equipment |

# Task List

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