

February 24, 2020

Richie Kaur
California Air Resources Board
1001 I Street
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Sacramento, CA 95812
(Submitted via email to richie.kaur@arb.ca.gov)

Re: AHRI Comments to CARB's Request for Input on the Draft Regulatory Language Following the January 30, 2020 Public Meeting

Dear Ms. Kaur,

On January 30, 2020, the California Air Resources Board (CARB) hosted a public workshop regarding the proposals and draft language to regulate stationary air-conditioning and commercial refrigeration equipment. These comments contain feedback from original equipment manufacturers (OEMs) of AHRI regarding the draft regulation along with responses to the questions CARB raised at the January 30 workshop.

AHRI represents over 300 air-conditioning, heating, and refrigeration equipment manufacturers. In North America, the annual output of the HVACR and water heating industry is worth more than \$44 billion. In the United States, the industry supports 1.3 million jobs and \$256 billion in economic activity annually.

In these comments AHRI addresses the following topics:

1. Definitions:
 - a. "Chillers"
 - b. "Date of Manufacture"
 - c. "New Air-conditioning Equipment"
 - d. "New Refrigeration Equipment"
 - e. "Dehumidifiers"
2. Table 3 Requirements for Refrigeration Equipment
 - a. Remote Condensing Units
 - b. Industrial Process Refrigeration Equipment (Not Chillers)
 - c. Industrial Process Refrigeration Chillers
3. Disclosure Statement
4. Building Code Updates
5. Request to submit additional comments

1. DEFINITIONS

a. “Chillers”

At the January 30 public workshop, CARB requested stakeholder feedback on the proposed definition of “chillers.”

U.S. EPA definitions:

“Chillers” typically cool water, which is then circulated to provide comfort cooling throughout a building or other location. Chillers can be classified by compressor type, including centrifugal and positive displacement. Chillers used to cool industrial processes are discussed under Industrial Process Refrigeration.

“Industrial Process Refrigeration” Industrial process refrigeration systems cool process streams in industrial applications.

At the January 30 workshop, CARB stated that they intend to rely on EPA’s SNAP listings of acceptable refrigerants, but differences in CARB’s definitions can lead to different classifications for equipment. It is critical that CARB consider aligning definitions with those listed in the EPA SNAP rules in order to rely on EPA SNAP listings for acceptable refrigerants.

AHRI requests that CARB align the definition of Chillers and Industrial Process Refrigeration with that of EPA.

b. “Date of Manufacture”

AHRI is concerned that the proposed definition of “Date of Manufacture” is not equitable across product types and will cause market confusion. Further, defining a “not factory completed” system’s “Date of Manufacture” fundamentally as the date of installation may strand equipment manufactured prior to the compliance date. AHRI recommends that CARB use a consistent definition for all product categories

AHRI recommends the following revisions to the definition of “Date of Manufacture”:

“Date of Manufacture” means:

- ~~— for foam, the date the foam system was initially manufactured;~~
- *for foam imported into the state, the date the foam was initially manufactured;*
- *for foam systems imported into the state, the date polyurethane blend and isocyanate were packaged or labeled*
- *for chillers, air-conditioning and refrigeration equipment, the date that the manufacturer affixed an equipment label indicating the equipment’s date of manufacture shall apply to all of the components of the equipment; ~~for chillers, air-~~*

~~conditioning and refrigeration equipment not factory-completed and built-up or assembled on site, the date of manufacture shall be the initial date that refrigerant was initially added or charged into the equipment.~~

AHRI also asks CARB to define “Foam System” as isocyanate and polyurethane blends sold for the intended purpose of manufacturing a polyurethane foam.

c. “New Air-conditioning Equipment”

AHRI requests the following revision to the definition of “New Air-conditioning Equipment”:

“New Air-conditioning Equipment” means any air-conditioning equipment or system that is first installed using new or used components, or a combination of new or used components, or a new outdoor self-contained unit or condensing unit in an existing system, ~~or a new evaporator unit in an existing system.~~

AHRI supports the intent of this clause which was added to prevent piecemeal system replacements and dry-shipped units to avoid low-GWP refrigerant compliance but believes that it will result in unnecessary costs to end users during repair or replacement of an evaporator unit. AHRI is concerned that the inclusion of “evaporator” units in the proposed definition of “New Air-conditioning Equipment” would result in the unwarranted replacement of the entire systems before the end of their useful life adding significant cost to consumers and end-users.

The cost of replacing the evaporator coil is a fraction of the cost compared to the cost of the entire unit or system. This requirement would obsolete the entire system potentially before the end of its useful life and be extremely burdensome to consumers. For smaller systems, a new residential system (outdoor condenser and an indoor evaporator) will range in cost from \$4000 to \$8000 for the equipment and labor, whereas to repair an evaporator coil and recharge existing system will cost less than \$1200 installed. For a typical larger rooftop unit, a new system installed is \$100,000 or higher, and just a coil replacement can be \$20,000 and higher. The repair and/or replacement of components in “packaged” rooftops throughout their useful life should be allowed to avoid costly and unnecessary replacement of entire systems in the event of an evaporator failure.

With AHRI’s revised definition for “New Air-conditioning equipment,” if an outdoor unit fails, it will be replaced with a low-GWP condensing unit. This necessitates the replacement of the indoor unit because R-410A indoor units will likely be incompatible and non-compliant with required safety standards.

In addition, “Evaporator Unit” is not a common term used by the HVAC industry; CARB may be referring to a “coil,” “fan coil,” or “air-handler”.

The majority of units sold in California’s commercial stationary market are “packaged” rooftop units and are principally applied on restaurants, shopping centers, office buildings and schools. These units can have a single factory-sealed refrigerant loop, including the evaporator coil, fans, condensing coil, and compressor system. Their typical life cycle ranges from 15-18 years for smaller, light commercial sizes, to 20-25 years for large, heavy industrial and commercial sizes. Repairs over the life of the unit can include an evaporator coil replacement, compressor replacement, or coil repair. While these repairs will require the unit’s refrigerant to be pumped down or reclaimed and held in reserve, once a repair or replacement coil or compressor is installed the original refrigerant will be charged back into the unit.

AHRI assumes that CARB’s definition of New Air-conditioning Equipment is attempting to capture the replacement of the compressorized (refrigerant-determining) part of the Air-conditioning System. A “condensing unit” is one half of a split system that includes a compressor contained within the outdoor remote condensing unit mated to an indoor fan coil or air handler. There is also a type of split system in which the compressor is located inside within an “indoor self-contained unit” and the outdoor unit is defined as a “condenser,” rather than a “condensing unit.” The most common split system type is one with a condensing unit, but both types of split systems should be referenced to not infer one type is excluded from this definition.

d. “New Refrigeration Equipment”

AHRI is concerned that the definition of “New Refrigeration Equipment” is worded to include equipment first installed in more than just new construction. We strongly request that CARB remove part 2(C) of the proposed definition and clarify that the latter half of the definition applies to only new construction or a converted facility not previously used for retail food, commercial, cold storage, or industrial refrigeration. Previous proposals were limited to only these conditions, and AHRI does not support the inclusion of a 150 GWP limit for refrigeration equipment in existing facilities by 2022.

AHRI also would like to reiterate its support to revise part 1(B)(i) of the definition to change “capacity” to “Nominal Compressor Capacity”. We have also provided a proposed definition for Nominal Compressor Capacity below.

AHRI requests that CARB make the following revisions to the definition of “New Refrigeration Equipment”:

“New Refrigeration Equipment” means any of the following:

(1) Any refrigeration equipment applicable to refrigeration end-use sectors listed in Table 1, section 95374(a) that is:

(A) First installed using new or used components, or a combination of new or used components; or

(B) Modified such that:

(i) The *total Nominal Compressor Capacity* is increased* ~~through the addition of components including refrigerant lines, evaporators, compressors, condensers, and other components~~; or

(ii) The system has experienced replacements of components in full or exceeding 50 percent of the capital cost of replacing the entire refrigeration system, excluding the cost of refrigerated display cases

(2) Any refrigeration equipment that is first installed using new or used components, or a combination of new or used components, applicable to refrigeration end-use sectors listed in Table 3, Section 95374(c), in the following:

(A) New construction; or

(B) In an existing facility not previously used for retail food, commercial, cold storage, or industrial refrigeration; or

~~(C) In an existing facility, replacement of 75 percent or more of: compressors, condensers, and connected evaporator loads.~~

**Replacing or adding a new case or component in existing system is not considered new equipment as long as the Nominal Compressor Capacity of the system is not increased.*

“Nominal Compressor Capacity” means the capacity of the system’s compressor(s) based on published ratings in accordance with a recognized standard such as AHRI Standard 540.

AHRI is also seeking clarity as to whether commercial refrigeration equipment installed in new construction or in an existing facility not previously used for retail food, commercial, cold storage, or industrial refrigeration would be added to the equation used to define compliance with global warming potential phase-down. If it will be added to that equation, when in the product life-cycle would it be added?

e. AHRI proposed definition for “Dehumidifiers”

At the January 30 stakeholder meeting, CARB stated that the regulation is intended to include dehumidifiers under the definition of “Air-conditioning Equipment.” As written, the draft definition of “Air-conditioning Equipment” does not include dehumidifiers. If it is CARB’s intent to include these systems, EPA definitions are provided below.

AHRI encourages CARB to align its definitions with EPA's definitions below:

“Residential Dehumidifiers”

Residential dehumidifiers are primarily used to remove water vapor from ambient air or directly from indoor air for comfort or material preservation purposes. While air-conditioning systems often combine cooling and dehumidification, this application serves only the latter purpose.

2. TABLE 3 REQUIREMENTS FOR REFRIGERATION EQUIPMENT

a. Remote Condensing Units

During earlier comments, AHRI expressed support for a 150 GWP limit for equipment with more than 50 pounds of charge for new buildings or refrigeration greenfield construction except for the category of Remote Condensing Units due to the significant technological difficulties. CARB's most recent proposal categorizes remote condensing units as refrigeration equipment with a 150 GWP limit by 2022.

AHRI strongly requests that CARB reconsider a 300 GWP limit for remote condensing units in 2024.

Additionally, the higher GWP can allow for more efficient options which has a greater impact on emissions than the small impact of 150 vs. 300 GWP reduction.

A 300 GWP limit for remote condensing units allows A2L HFO-blend refrigerant R-454A (GWP of 236 per AR4) and others to be used. R-454A refrigerant has glide on par with R-448A and R-449A, so manufacturers are accustomed to designing for it and do not anticipate significant issues. R-454A has a high discharge temperature, thus necessitating liquid injection; therefore, units may be more costly, but not greatly so. The operating characteristics of R-454A are likely to enable a straightforward path to DOE WICF compliance.

As mentioned in previous comments, there are no practical refrigerant options in the proper, medium pressure range for commercial refrigeration under 150 GWP. Blend refrigerants under 150 GWP have extremely high glide [$>20^{\circ}\text{R}$] and consequently may result in significant problems during application. Assuming typical options and average piping lengths to the associated loads, the charge size of remote condensing units ranges from 5 lb. to 300 lb., thus no hydrocarbons or ammonia will be allowed foreseeably by safety standards in draft form today, leaving carbon dioxide as the only choice below 150 GWP.

Condensing units for Walk-in Cooler & Freezer (WICF) applications, regardless of refrigerant, are also held to strict new Department of Energy regulations, thus preserving energy efficiency is of paramount importance. The energy-saving options required to make a remote condensing unit using CO2 compliant with WICF regulations increase their cost significantly. Some options may include a larger condenser (gas cooler coils), additional cooling coils for de-superheating and intercooling, parallel compression, ejectors, and so on.

Moreover, because CO2 has been used in supermarket-size racks and larger, the supply chain for all required components does not yet exist in the necessary size range. The exception to this size statement is small CO2 bottle coolers for medium temperature only – also at an unsuitable size to fulfill all condensing unit supply chain needs.

b. Industrial Process Refrigeration Equipment (Not Chillers)

AHRI submitted a proposal for Industrial Process Refrigeration (IPR) equipment on January 14, 2020:

Equipment Type (>50 lbs. charge)	Fluid Leaving Operating Temp [F]	GWP [100yr AR4]	Date
IPR Equipment	-10 to +35	1500	2024
IPR Equipment	-58 to -10	2200	2024

In its draft regulation, CARB included IPR Equipment (except Chillers) in the definition of Refrigeration Equipment, assigning this IPR equipment a 150 GWP limit in 2022.

As described in the January 14, 2020 comments, AHRI explained the significant challenges associated with the options available below 150 GWP. For IPR equipment, there are flammable and high glide refrigerant choices, cascade system with flammable refrigerants on the high-temperature state and CO2 on the low-temperature state, and CO2 transcritical systems. AHRI would reiterate to CARB that a 150 GWP limit by 2022 does not provide enough flexibility in the choices available. Building codes updates are required to enable lower flammability refrigerants which will not be available by 2022. CO2 transcritical systems pose energy efficiency and servicing challenges. Considering the overall energy efficiency of CO2 transcritical systems will be critical going forward to avoid unnecessary energy use and associated emissions at power plants. Further technical justification from AHRI’s January 14, 2020 comments are attached as Exhibit 1. Note that AHRI’s proposal in the above table has been revised to include operating temperatures down to -58 degrees F which is the threshold defined by F-Gas and CARB’s proposed regulation.

AHRI requests that CARB reconsider the 150 GPW limit by 2022 for all IPR equipment and align with the proposals in the table above.

c. Industrial Process Refrigeration Chillers between -15°F and +35 °F

AHRI submitted a proposal for IPR Chillers on January 14, 2020:

Equipment Type (>50 lbs. charge)	Fluid Leaving Operating Temp [F]	GWP [100yr AR4]	Date
IPR Chillers	-10 to +35	1500	2024

In its draft regulation, CARB proposed a GWP limit of 750 for all IPR Chillers operating above -15°F. In previous discussions, CARB has suggested that a 750 GWP limit is possible due to the availability of refrigerants like R-513A and R-32 (A2L). AHRI maintains the concern that A2Ls may not be appropriate for all industrial process refrigeration as the refrigerant is not guaranteed to be located in confined spaces with appropriate safety measures. Additionally, the only current non-flammable refrigerant available without glide allowing a flooded design would be R513A, but this would potentially be operating in a vacuum due to the systems design and pressure drop at -10°F. Having the limits of 1500 GWP would allow the flexibility of safely operating at -10°F with three other refrigerant choices.

AHRI requests that CARB adopt a 1500 GWP limit for Chillers with a fluid leaving operating temperature between -10 and +35 degrees F.

3. DISCLOSURE STATEMENT

AHRI strongly recommends that disclosure requirement language be concise and generic. As CARB is aware, an important policy consideration in implementing state regulation is the additional burden that a state-by-state patchwork of regulations can impose on a line of products that are marketed and sold nationally. A practical regulation would harmonize as much as possible with other states' requirements to reduce added costs to California consumers for California-specific products. As such, we encourage CARB to adopt generic language in 95375 (c) to align with other U.S. Climate Alliance states adopting HFC regulations. Attached as Exhibit 2 are AHRI recommendations to the Climate Alliance regarding administrative controls for HFCs, including a proposed language for a disclosure statement.

4. BUILDING CODE UPDATES TO ALLOW FOR A2LS

As commented previously, the California building codes must be fully updated to enable the safe use lower-GWP refrigerants. The model building code to enable the use of mildly flammable refrigerants is not yet available. The ability for the industry to comply

with this proposal is contingent on the adoption of updated safety standards into California building codes.

With an effective date of January 1, 2023 for air-conditioning equipment, building codes must be updated in 2020 for equipment manufactures to have enough time to properly develop new low-GWP products. The refrigeration equipment manufacturers also share these concerns and need the California codes updated, as they must be prepared to comply by January 1, 2022. Despite refrigerant manufacturers advertising low GWP refrigerants available for purchase now, manufacturers need time to test the components and systems and possibly design new technology. Manufacturers must validate performance with the new refrigerant alternatives before HVACR equipment manufacturers can then make educated decisions of which components are optimal for their specific applications and complete required testing to meet the DOE and safety standard requirements to ensure an efficient, safe, and reliable transition.

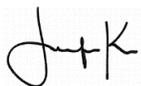
Timely adoption of the safety standards into the California model building code is critical to ensure requirements are clear and provide sufficient lead time for manufacturers to design products in compliance with the code requirements.

5. FURTHER FEEDBACK FROM THE AIR-CONDITIONING SECTOR

AHRI members that manufacture equipment included in the proposed definition of “Air-conditioning Equipment,” that were not explicitly mentioned as part of the scope of this regulation are meeting on February 26, 2020 to discuss the impact and possible concerns. Additional comments may be generated as a result of these discussions, and AHRI requests the opportunity to provide this feedback after the input deadline of February 21, 2020 if necessary.

AHRI greatly appreciates the opportunity to provide these comments. We look forward to further engagement with CARB to provide any additional information or clarification of the above proposals. Should you have any questions regarding this submission, please contact Helen Walter-Terrinoni [hwalter-terriononi@ahrinet.org, (302) 598-4608] or Jennifer Kane [jkane@ahrinet.org, (703) 600-0304].

Respectfully,



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Exhibits:

1. AHRI Comments to CARB Regarding HFC Regulations on Industrial Process Refrigeration Equipment
2. AHRI Recommendations to Climate Alliance for HFC Administrative Requirements