IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Brent W. Murray, et al.	
U.S. Patent No.:	7,207,181	Attorney Docket No. 43789-0259IP1
Issue Date:	April 24, 2007	
Appl. Serial No.:	11/069,378	
Filing Date:	March 1, 2005	
Title:	REFRIGERATION UNIT CONDENSATION PREVENTION	

SUPPLEMENTAL DECLARATION OF DR. GREGOR P. HENZE, PH.D., P.E.

Exhibit 1061
Anthony v. ControlTec
IPR2025-00559

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LISTING OF CHALLENGED CLAIMS

Claim 1	
[1.pre]	Condensation control apparatus for a refrigerated display case having at least one door, a frame and at least one frame/door heater, said apparatus comprising:
[1.a]	a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame and including a carrier having a temperature sensor thereat;
[1.b]	a dew point sensing unit adapted for monitoring ambient air temperature and relative humidity outside of the display case and including a carrier having at least one dew point sensing component thereat;
[1.c]	a control unit communicating with said sensing units and including processing means connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a preselected set point above a dew point value derived from monitored ambient temperature and relative humidity; and
[1.d]	housing means for locating said sensing units including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said sensing units and said housing means and locating said temperature sensor and said at least one dew point sensing component amid insulated air pockets formed by said structure of said housing means.

Claim 2	
[2]	The apparatus of claim 1 wherein said housing means includes a frame temperature sensing unit housing, said frame temperature sensing unit housing including a base and a cover, said cover having a depth creating a first one of said air pockets at one side of said temperature sensing unit and said base including an opening for receiving said temperature sensor therethrough, said opening having an opening area greater than surface area of said temperature sensor thus establishing a second one of said air pockets around said temperature sensor.

Claim 3	
[3]	The apparatus of claim 2 wherein said frame temperature sensing unit housing includes a single locating post at said cover for securing position of said temperature sensing unit relative to said cover.

Claim 4	
[4]	The apparatus of claim 1 wherein said housing means includes a dew point sensing unit housing, said dew point sensing unit housing including a mounting base and cover, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component.

Claim 5	
[5]	The apparatus of claim 4 wherein said cover of said dew point sensing unit housing includes opposite end openings to establish ambient air flow through said dew point sensing unit housing.

Claim 6	
[6]	The apparatus of claim 4 wherein said mounting base of said dew point sensing unit housing includes protrusions establishing retaining pockets receiving said carrier of said dew point sensing unit at outer edges of said carrier and further establishing a first one of said air pockets amid said protrusions and adjacent to said carrier.

Claim 7	
[7]	The apparatus of claim 1 wherein said housing means includes a cover and a base, said cover including a cover face opening therethrough for receiving said at least one dew point sensing component therein, said cover face opening including a protective shield thereover having air gaps therearound allowing air flow between said protective shield and said cover and thus over said at least one dew point sensing component, and said base having depth creating a first one of said air pockets at least at one side of said temperature sensing unit and a second one of said air pockets at one side of said dew point sensing unit.

Claim 8	
[8.pre]	A system for condensation control at an array of refrigerated display cases, the cases each having at least one door, a frame and at least one frame/door heater, said system comprising:
[8.a]	sensing and control apparatus configured for location at each display case in the array of display cases,
[8.b]	said apparatus including a frame temperature sensing unit adapted for mounting at the display case for monitoring temperature of one of the display case door or display case frame,

[8.c]	[said apparatus including…] a dew point sensing unit adapted for mounting at the display case for monitoring ambient air temperature and relative humidity outside of the display case,
[8.d]	[said apparatus including…] an internal case temperature sensing unit positionable inside the display case, and
[8.e.i]	[said apparatus including…] processing means mountable at the display case and connected for activating the display case frame/door heater when monitored display case door or frame temperature drops below a first preselected set point above a dew point value derived from monitored ambient temperature and relative humidity, for deactivating the frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above said dew point value, and
[8.e.ii]	[processing means…connected…] for storing data related to readings at said sensing units and operation of the frame/door heater; and
[8.f]	a communication control unit associated with said processing means for coordinating programming and data download access to said processing means of said apparatus.

Claim 9	
[9]	The system of claim 8 further comprising a central processing unit and wherein said communication control unit includes a transmitter/receiver for wireless communication with said central processing unit.

Claim 10	
[10]	The system of claim 8 wherein said processing means of said apparatus is separately housed in a housing having dimensions selected so that said housing is mountable between standard door frame mullions provided at the display case.

Claim 11	
[11]	The system of claim 8 wherein said processing means of said apparatus includes a reset/programming interface.

Claim 12	
[12]	The system of claim 8 wherein said frame temperature sensing unit and said dew point sensing unit are mounted together in a housing.

Claim 13	
[13]	The system of claim 8 further comprising housing means for locating said temperature sensing unit and said dew point sensing unit and including structure establishing thermal isolation of said sensing units by minimizing heat transfer contacts between said temperature sensing unit and said dew point sensing unit and said housing means and locating said temperature sensing unit and said dew point sensing unit amid insulating air pockets formed by said structure of said housing means.

Claim 14	
[14.pre]	A system for condensation control at a refrigerated display case having at least one door, a frame and at least one frame/door heater, said system comprising:
[14.a]	a temperature sensing unit in contact with the display case frame to monitor case frame temperature;
[14.b]	a dew point sensing unit on the display case to monitor ambient air temperature and relative humidity outside the display case; and

[14.c]	control means for receiving data from said sensing units and utilizing monitored case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater responsive thereto.

Claim 15	
[15]	The system of claim 14 further comprising means for thermally isolating said dew point sensing unit from variations in temperature of the display case frame or display case door.

Claim 16	
[16]	The system of claim 14 further comprising means for thermally isolating said temperature sensing unit from variations in temperature of ambient air.

Claim 17	
[17]	The system of claim 14 further comprising an internal case temperature sensing unit mounted inside the display case and communicating with said control means for monitoring internal case temperature.

Claim 18	
[18]	The system of claim 17 further comprising data storing means communicating with said control means for storing data related to readings at said sensing units and operation of the frame/door heater.

Claim 19	
[19]	The system of claim 18 further comprising means for wirelessly accessing stored data at said data storing means.

Claim 20	
[20]	The system of claim 14 wherein said means for wirelessly accessing data is configured for remotely updating control parameters at said control means utilized for monitoring case frame temperature, ambient air temperature and relative humidity to anticipate formation of condensation at the display case and activating and deactivating the frame/door heater.

I, Gregor P. Henze, declare as follows:

I. INTRODUCTION

1. I have been retained as a technical expert on behalf of Anthony Inc. ("Anthony"/"Petitioner"). I understand that Anthony is requesting that the Patent Trial and Appeal Board institute an *inter partes* review ("IPR") proceeding with respect to U.S. Patent No. 7,207,181 ("the '181 patent") (EX1001).

2. I understand that this declaration ("Supplemental Declaration") will be submitted in support of Petitioner's Reply to Patent Owner's Response to the Petition for *inter partes* review of the '181 patent. This Supplemental Declaration supplements certain portions of my prior declaration in support of the Petition for this IPR Proceeding (EX1003, "Prior Declaration"). In my Prior Declaration, I address many topics, including (but not limited to) my background and qualifications, the level of skill in art, an overview of the '181 patent, a POSITA's background knowledge, certain legal standards explained to me by counsel, and a detailed analysis of the prior art against the claim elements of the '181 patent.

3. I maintain all of my earlier analysis and continue to hold the opinions expressed in my Prior Declaration. This Supplemental Declaration does not replace my Prior Declaration. These declarations are complementary and should be read in tandem. Accordingly, this Supplemental Declaration does not cover every topic addressed in my Prior Declaration.

4. In forming this Supplemental Declaration, I have considered the following: the declaration of Patent Owner's expert Mr. Pollock (EX2014) and the documents cited therein (EX2015 through EX2024), the Board's institution decision (Paper 13), my personal knowledge and experience, including my research and work experience, and the third-party documents cited throughout my analysis.

5. Note that my citations to non-patent literature throughout this Declaration reference the absolute page number added to the exhibit (as opposed to the original pagination of the document). For patent literature, I've used the column/line numbers or paragraph numbers. Also note that, unless I've indicated otherwise, all emphasis (bold/italics/underline) in any quoted text are ones I have added.

6. Although I cite and quote to selected portions of various references in this Supplemental Declaration, the reader should understand that these citations are representative examples. A POSITA would have viewed each reference in its entirety and in combination with other references. Accordingly, I intend the references identified in this Declaration to be viewed as incorporated in their entireties.

7. I am not, and never have been, an employee of Anthony. I received no compensation for this Declaration beyond my normal hourly compensation based on my time spent analyzing the '181 patent, the prior art publications cited below, and

various issues related thereto. I will not receive any added compensation based on the outcome of any IPR or other proceeding involving the '181 patent.

II. LEGAL PRINCIPLES

8. In forming my analysis and conclusions expressed in this Declaration, I have applied the legal principles described in the following paragraphs, which were provided to me by counsel for the Petitioner.

A. Person of Ordinary Skill in the Art

9. I understand that the factors considered in determining the ordinary level of skill in a field of art include: the level of education and experience of persons working in the field; the types of problems encountered in the field; the teachings of the prior art regarding solutions to such problems; and the sophistication of the technology at the time of the alleged invention. I understand that a person of ordinary skill in the art ("POSITA") is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above and knowledge of all relevant prior art references, including the references I cite below.

B. Obviousness

10. I have been informed that a patent claim is invalid as "obvious" in light of one or more prior art references if it would have been obvious to a POSITA at the time of the alleged invention, taking into account (1) the scope and content of the

prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called "secondary considerations" of non-obviousness, which include: (i) "long-felt but unresolved need" for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) "copying" of the claimed invention by others.

11. While I do not know the exact date that the alleged invention of the '181 patent was made, I do know that the '181 patent's earliest claimed priority date—its filing date—is March 1, 2005. For purposes of my obviousness analysis, I have applied a date of March 1, 2005 as the date of the alleged invention ("Critical Date"), although in many cases the same analysis would hold true even if the date of the alleged invention were earlier or later.

12. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason that would have prompted a POSITA to modify or supplement the single prior art reference, or to combine two or more references, in a manner that provides the elements of the claimed invention. This reason may come from a teaching, suggestion, or motivation to combine, or may come from the reference(s) themselves, the knowledge or "common sense" of a POSITA, or from the nature of the problem to

be solved, and this reason may be explicit or implicit from the prior art as a whole. I have been informed that, under the law, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand it is improper to rely on hindsight in making the obviousness determination.

13. I understand that an obviousness determination also requires that a POSITA would have had a reasonable expectation of success. This concept has been explained to me as relating to the relative likelihood or predictability—from the perspective of a POSITA—of successfully modifying the prior art in a manner that would meet the claimed limitations of the patent being challenged (here the '181 patent). I understand that the expectation of success need only be "reasonable" and, thus, does not require the absolute certainty gleaned from physically creating the proposed prior art modification.

C. Claim Interpretation

14. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in the patent claims should be interpreted according to their "ordinary and customary meaning." In determining the ordinary and customary meaning, I understand that the words of a claim are first given their plain meaning that those words would have had to a person of ordinary skill in the art at the time of the alleged invention. I also understand that the structure of the claims,

the specification and file history may be used to better construe a claim. Moreover, I understand that even treatises and dictionaries may be used, albeit under limited circumstances, to determine the meaning attributed by a person of ordinary skill in the art to a claim term.

III. ANALYSIS

15. The analysis and opinions expressed in my Prior Declaration fully explain why [1] each and every feature of the '181 patent's challenged claims is in the prior art; and [2] a POSITA would have been motivated to combine the known prior art elements in a manner that reaches the claimed invention. Patent Owner's expert, Mr. Pollock, has considered my opinions and offered his own, some of which are inconsistent with my view. I will address certain points of dispute below. The fact that I have not addressed all of Dr. Pollock's opinions (and cited documentation) should not be interpreted as agreement with any of them.

A. Person of Ordinary Skill in the Art (POSITA)

16. Based on my knowledge and experience in the field and my review of the '181 patent and its file history, I believe that a POSITA would hold a bachelor's degree in mechanical engineering, electrical engineering, or a comparable field and at least three to five years of professional experience working with heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems. Such

experience could be obtained through research and study in a graduate program or through comparable exposure through industry employment, and additional years of experience could substitute for the advanced-level degree.

17. I expressed this same opinion in my Prior Declaration, and I maintain that it is the correct articulation of the ordinary skill level. EX1003, ¶¶31–32.

18. The problems presented in the ’181 patent are archetypal HVAC&R considerations that are not unique to refrigerated display cases. It is my opinion that the technical challenges associated with mitigating condensation on refrigerated display cases are applications of classical engineering principles, for which a bachelor’s degree in mechanical engineering, electrical engineering, or a closely related field, supplemented by three to five years of professional experience in heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems, constitutes a sufficient qualification. Refrigerated display cases do not operate under a unique set of physical laws. Rather, they are governed by the universal principles of thermodynamics, psychrometrics, and heat transfer that form the bedrock of a standard engineering curriculum and broader HVAC&R practice that I have been educating for more than 25 years.

19. The phenomenon of condensation occurs when the surface temperature of a surface falls below the dew point temperature of the ambient indoor air. Addressing condensation risk requires the application of thermal energy to maintain

the surface temperature above saturation point. A degreed engineer with three to five years of experience in the HVAC&R industry has already applied these calculations to countless scenarios, from evaluating building envelopes in the context of heating load calculations containing windows experiencing condensation risk to cooling coils that only dehumidify when the apparatus (coil surface) dew point temperature is below the air's dew point. To suggest that the physics of a display case frame are so distinct as to require further specialized refrigerated display case experience is to suggest that the laws of heat transfer and psychrometrics change based on the equipment's chassis. But that is definitely not the case.

20. Furthermore, the electrical integration of anti-sweat heaters—specifically the use of controllers to modulate power based on dew point approach—falls squarely within the competency of an electrical or mechanical engineer with a few years of applied experience. For example, the logic used in pulse-width modulation for on/off devices such as heaters and sensor-driven feedback loops is common across the HVAC&R sector. A professional with the proposed background possesses the necessary "applied intuition" to account for real-world variables such as sensor uncertainty, air velocity, and ambient fluctuations without requiring exposure to a specific product category. The three-to-five-year experience threshold is particularly significant as it represents the period during which a professional

transitions from theoretical proficiency to the mastery of industry standards, particularly those set by ASHRAE.

21. Ultimately, the problem of display case condensation is generic in nature because the variables are finite and the governing equations are fixed. While a specialist may have greater familiarity with certain manufacturer-specific hardware characteristics, they do not possess a superior scientific methodology. The analytical framework provided by a relevant engineering degree, combined with the practical rigors of multi-year HVAC&R employment or graduate-level research, provides all the requisite expertise to design, troubleshoot, and optimize these systems with a high degree of professional certainty. No further specialization is required to meet the standard of care for this technical domain.

22. The ’181 patent background talks about issues with “reactive” sensors that detect condensation directly only after it has already formed, and it proposes using temperature and humidity sensing to instead anticipate the formation of condensation through dew point calculation. EX1001 (’181 patent), 1:14–40. Each of these types of sensors was well-known and used in many applications in the HVAC&R field. Direct condensation detection primarily employs resistive, capacitive, or optical technologies to identify liquid-phase moisture. Resistive condensation sensors utilize interdigitated conductive tracks that act as an open circuit when dry; the formation of moisture bridges these tracks, sharply dropping

resistance to trigger a control response. While simple, their exposed electrodes are susceptible to environmental fouling. Capacitive sensors instead monitor the dielectric constant of the sensing surface, which rises significantly as water replaces air. This allows electrodes to be hermetically sealed, providing superior long-term reliability in harsh HVAC&R environments. For high-precision applications, optical sensors project an infrared beam into a prism. The presence of condensation disrupts the refractive index at the prism's surface, scattering the light and reducing the signal captured by a photodetector. This optical method represents the "gold standard" for accuracy, frequently used in the calibration of industrial climate controls. Thus, a POSITA with several years' experience in the HVAC&R field would be very familiar with these sensors, whether or not they had specific hands-on experience with refrigerated display cases.

23. The '181 patent background also talks about problems with the accuracy of temperature readings, especially where both cold and warm environments are adjacent to one another. EX1001 ('181 patent), 1:41–65. Again, this problem is not unique to refrigerated display cases, and a POSITA with several years' experience in the HVAC&R field would understand how to address these issues. The accuracy of temperature measurement in environments where extreme thermal gradients exist—such as the interface between a refrigerated interior and a heated frame—is frequently compromised by a phenomenon known as "stem

effect." This occurs when the sensor's own lead wires or mounting hardware act as a thermal bridge, conducting heat from the warmer ambient environment directly into the sensing element. This physical reality creates a localized bias, causing the sensor to report a temperature higher than the actual surface or air it is intended to measure. Furthermore, sensors in these high-gradient zones are susceptible to radiant heat exchange; a sensor positioned to monitor cold air may be "washed" by infrared radiation from an adjacent warm frame, leading to an inaccurate representation of the true thermal state. These measurement challenges are not unique to the refrigerated display case industry; they are fundamental hurdles encountered across the entire spectrum of thermal science. An HVAC&R professional with three to five years of experience is well-versed in these common errors and understands that the solution lies in the application of standard mitigation techniques, such as the use of thermal decoupling materials, proper sensor immersion depths, and reflective radiation shielding.

24. While the '181 patent does discuss refrigerated display cases, the claims are not directed toward any purportedly novel features of a refrigerated display case. Instead, the claim elements focus on the sensors and heating controls, reaffirming that the main problem statement of the '181 patent relates to these general HVAC&R concepts.

25. I have reviewed Mr. Pollock's discussion of what he claims to be "specific concerns" a POSITA would have to address in the context of refrigerated display cases, and I disagree.

26. For example, I disagree that thermal characteristics of refrigerated display cases lead to unique concerns "due to the frame and glass combination used." EX2014 ¶11. While not all refrigerators require consideration of the thermal characteristics of a frame and glass combination, many other HVAC&R applications do. For example, when designing an HVAC&R system for a building, a POSITA must consider and develop systems to remediate the potential risk of condensation on building windows. In many modern commercial buildings, architects specify large glazing surfaces, for instance deployed in atria. A POSITA would likely be tasked with specifying glazing, structural, and HVAC systems to prevent condensation by designing a code compliant façade, an HVAC system capable of dehumidifying and/or heating the indoor air under all conditions for there to be a safe "dew point margin" of any surface of 2–3°C above the air's dew point, along with a sensing and alarming infrastructure to detect and respond to condensation risk. Other common HVAC systems that require condensation control include chilled ceilings, chilled beams, and thermally activated building structures (TABS) that embed water tubes in the concrete core of the building's floor structure.

27. I also disagree that "customer interactions with refrigerated display cases lead to different concerns related to the size, shape and location of sensors to prevent interference of customers with such systems." EX2014 ¶11. Sensor placement is always a consideration in designing an HVAC&R system, and there are many such systems where a POSITA would consider how to place sensors to avoid potential interference from third parties. The assertion that customer interaction necessitates specialized expertise in sensor placement is at odds with the broader discipline of HVAC&R engineering. A POSITA recognizes that physical and environmental interference from third parties is a standard design consideration encountered across nearly all public-facing climate control systems. Whether designing for a high-traffic hotel lobby, a school, a hospital, or a public transit vehicle, an engineer must routinely account for the risks of accidental impact, intentional tampering, and localized thermal anomalies caused by human proximity. Because these design considerations that balance hardware accessibility with data integrity are foundational to the standard of care across the HVAC&R industry, the specific geometry of a refrigerated display case does not represent a unique technical hurdle. Consequently, an engineer with the proposed three-to-five-year professional background possesses the requisite competency in sensor integration to transfer their skill to retail refrigeration for solving these common placement challenges.

28. I also disagree that supermarket display cases present unique challenges relating to "coordination of sensors, packaging, airflow, and control hysteresis," or "that small differences in sensor placement, thermal isolation, and algorithm design materially affect performance, energy use, and reliability" more so than other HVAC&R applications. Again, a POSITA knows to evaluate each of these considerations when designing a multitude of different HVAC&R systems. The assertion that refrigerated display cases present a unique nexus of sensor coordination, airflow, and control hysteresis is technically unfounded, as these interdependencies define the baseline complexity of any automatically controlled thermal system. Control hysteresis—the management of deadbands to prevent short-cycling—is a common application of control theory common to all HVAC&R problems involving on/off and multistage equipment. Similarly, the fact that performance and energy use are sensitive to variations in and proper selection of sensor placement or thermal isolation reflects universal thermodynamic principles rather than a sector-specific challenge. A POSITA with the proposed background is adequately trained to determine these variables using standard heat transfer calculations, design thinking, and control system design. Because coordinating sensor packaging with airflow is a requirement in any high-performance thermal environment, the refrigerated display case remains a standard application of engineering rigor. No specialized industry tenure is required to navigate these

variables, as they are governed by the same mathematical and physical laws found in any commercial or industrial climate control installation.

29. I also disagree that a POSITA with the background articulated in my Prior Declaration lacks the ability to understand the components of the '181 claims (such as a display case door) without direct professional experience working on refrigerated display cases. To the contrary, I expect that even most consumers who have shopped at a supermarket understand what a display case door is. From an engineering standpoint, these components are standard thermal and mechanical assemblies composed of well-understood elements: multi-pane insulated glass units (IGUs), thermal breaks, elastomeric gaskets, and resistive heating elements. Therefore, no specialized tenure in retail refrigeration is necessary to deconstruct, analyze, or optimize these components, as they do not possess any domain-specific complexity that deviates from established laws of thermodynamics, heat transfer, and material science.

30. Regardless, I do have professional experience with refrigerated display cases. For example, I have analyzed the thermodynamic performance of these cases. As one example, I led a grant application that analyzed and enhanced commercial refrigeration systems in retail settings. In this, I proposed energy-cascading refrigeration architectures, which involve integration of low- and medium-temperature refrigeration racks with building-wide HVAC and water heating

systems. This experience is not limited to existing hardware but extends to the redesign of thermal exchange processes, such as the implementation of indirect glycol loops to mitigate refrigerant leakage and the development of dual air-path air handling units for optimized heat recovery. Furthermore, the experience encompasses the application of advanced control algorithms, including model predictive control, to manage the dynamic and nonlinear interactions between compressor power, head pressure, and fluctuating thermal loads. Consequently, this professional engagement provides a foundation for addressing the challenges of refrigerated display cases, as these units represent a subsystem of the more complex thermal systems managed and optimized within the greater body of HVAC&R work.

31. In short, I had no difficulty evaluating the ’181 patent or the prior art. I believe myself to be fully qualified to render opinions on this case on whether the ’181 patent claims were obvious.

B. Carter’s Heater Deactivation Technique

32. The ’181 patent’s claim 14 at Element [14.c] recites a “control means” for performing a function of “deactivating the frame/door heater responsive thereto.” The “thereto” references earlier-recited language of “anticipat[ing] formation of condensation at the display case.” The ’181 patent’s claim 8 at Element [8.e.i] recites a “processing means” for performing the function of deactivating the

frame/door heater when monitored display case door or frame temperature rises above a second preselected set point above said dew point value."

33. In my Prior Declaration (EX1003 ¶64, ¶67), I noted that each of these two "means" claim terms has a corresponding structure of a "microprocessor" executing the three-step algorithm of: [1] Discounting frame temperature by a preselected set point; [2] Determining if the discounted frame temperature is above a dew point value derived from ambient temperature and relative humidity; and [3] Turning off a heater relay if the discounted frame temperature is above the dew point value. *See* EX1001, 5:34–50 (discussing microprocessor 53), 8:29–45, 8:63–9:5 (discussing algorithm), Figure 13, Figure 14b (similar).

34. I also explained in my Prior Declaration (EX1003 ¶¶122–123), when discussing Element [14.c] (later reference in my Element [8.e.i] analysis), that Carter teaches that the heater is deactivated when the frame temperature reaches the ambient temperature:

> If the cabinet surface temperature is equal to the ambient temperature 38 the control unit 28 will deactivate the supplemental heat 70 by deactivating the switching unit[] 30. If the cabinet surface temperature is not equal to the ambient temperature 66, supplemental heat will continue to be supplied to the sealing surface 24 via the heating unit 34.

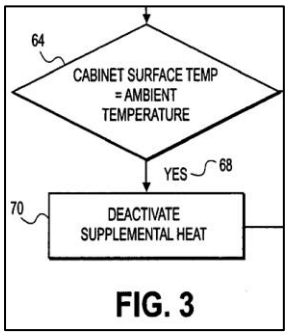


FIG. 3

EX1004 (Carter), 5:58–63, Figure 3 (above, right).

35. A POSITA would have recognized that Carter's technique employs a floating offset responsive to ambient conditions. As was well known in the art, dew point is generally defined as the temperature at which air at a prevailing pressure becomes saturated and vapor begins to condense out of the air. EX1030, 1 (providing a definition of dew point). Accordingly, the POSITA would have known that ambient temperature is virtually always greater than dew point and that the difference between them depends on—floats according to—the relative humidity of the ambient environment. A psychrometric chart, which provides a graphical representation of the physical and thermal properties of moist air, confirms this point. EX1031. In other words, ambient temperature differs from the dew point by a floating offset. As a result, Carter's comparison expression shown in Figure 3 (Step 64):

$$\boldsymbol{Cabinet\ Surface\ Temp = Ambient\ Temp}$$

is mathematically equivalent to:

$$\boldsymbol{Cabinet\ Surface\ Temp = Dew\ Point\ + Floating\ Offset},$$

which parallels the '181 patent's expression from Figure 14b:

$$\boldsymbol{Frame\ Temp\ - Set\ Point\ High > Dew\ Point}$$

and its mathematical equivalent:

$$\boldsymbol{Frame\ Temp > Dew\ Point\ + Set\ Point\ High}.$$

36. After describing how a POSITA would have interpreted Carter, I further explained in my Prior Declaration (EX1003 ¶129) how that the '181 patent uses a preselected set point and Carter uses a floating offset is an insubstantial and obvious distinction to a POSITA. In each case, the set point/offset serves as a buffer value to ensure that the frame temperature of the display case is far enough away from the dew point value to prevent anticipated condensation and without excessive on-off cycling of the heater. Absent an appropriate buffer value, the activating and deactivating target temperatures could be close enough to one another that minor variations or errors/uncertainty in temperature readings would cause the control unit to repeatedly oscillate between switching the heater on/off. Doing so would undermine the effectiveness of the control system and unnecessarily risk damage/wear to electromechanical components, such as the relay. The '181 patent's preselected set point and Carter's floating offset are both buffer values that aim to prevent this sort of unwanted, erratic control behavior.

37. To advance his opposing view regarding the differences between Carter and the '181 patent, Mr. Pollock references two charts titled "Ambient Temperature vs. Dewpoint Temperature" and "On/Off Temperatures." *See* EX2014 ¶¶56–57. I reproduce them below in my discussion for reference. According to Mr. Pollock, his charts show that "Carter deactivates late in lower humidity conditions and

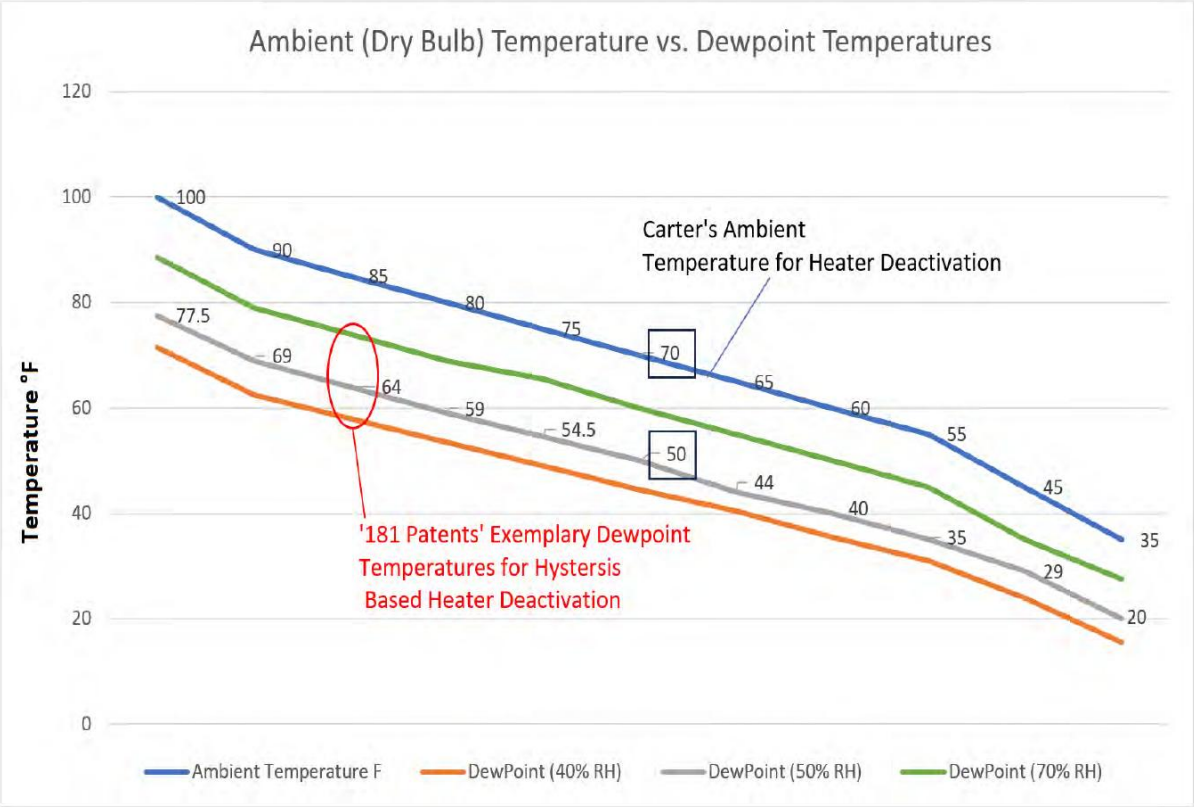
early/premature at high humidity conditions, when compared with the '181 Patent." EX2014 ¶56. I disagree.

38. Before providing my substantive response to Mr. Pollock, I note here that his charts are not supplied with any underlying data, assumptions, or explanation indicating his methodology for creating them. The omission of the underlying basis hinders peer review and is out of step with scientific and engineering best practices. For this threshold reason, I find Mr. Pollock's approach unreliable.

39. Mr. Pollock's charts and analysis do not offer a comparison between Carter and the '181 patent with respect to specific heater-deactivation temperatures. This is because the charts and Mr. Pollock's analysis of them are derived from specific setpoint values and relative humidity values that he (Mr. Pollock) selected in service of his position in this proceeding. Mr. Pollock provides no reasons for selecting these values; nor does he contend that the selected values have any connection to the '181 patent.

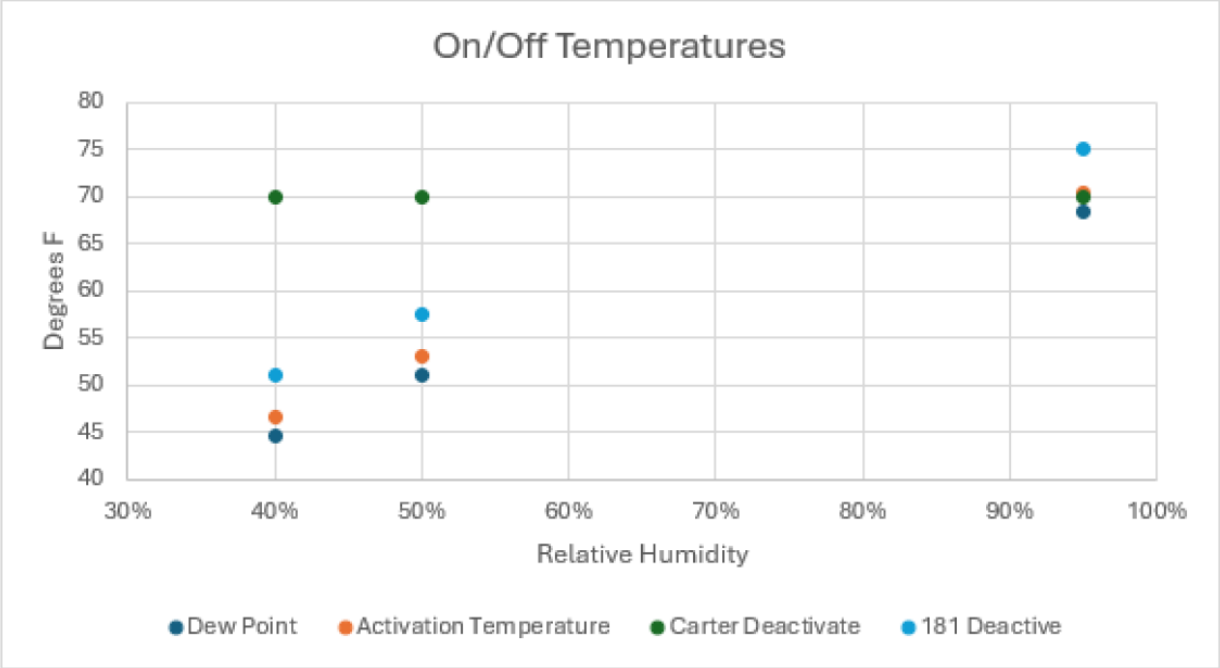
40. In his "Ambient Temperature vs. Dewpoint Temperature" chart, Mr. Pollock decided to chart certain "band[s] of dew point temperatures" at 40%, 50%, and 70% relative humidity. EX2014 ¶56. He also highlights certain dew point temperatures along these bands. Nowhere in his analysis does Mr. Pollock provide an objective basis for selecting these particular humidity and dew point values.

Importantly, the chart has neither an abscissa label nor scale, rendering the chart largely unreadable and forcing the reviewer to guess.



EX2014 ¶56.

41. In his "On/Off Temperatures" chart, Mr. Pollock decided to chart deactivation surface temperatures at relative humidity values of 40%, 50%, and 95%. He also decided to use an ambient air temperature of "70°F" and a preselected setpoint of "dew point plus 6.5°F" for the '181 patent's deactivation algorithm. Nowhere in his analysis does Mr. Pollock provide an objective basis for selecting these particular humidity or setpoint values.



EX2014 ¶56.

42. The '181 patent does not suggest any of the values Mr. Pollock decided to use for his analysis. In fact, the '181 patent does not offer any specific values at all for relative humidity, air or surface temperature, or any preselected setpoints. Details in the '181 patent's specification about the setpoints is noticeable sparse—e.g., that they can be loaded and stored in memory (Figure 14a–14b), and that they are "updatable in real time from central processing" (9:6–8). But these details, in addition to the specific values Mr. Pollock selects for the deactivation setpoint in his analysis (e.g., 6.5°F), are not part of the corresponding structure for the claimed "control means" of claim 14. In other words, those details are not necessary to

perform the claimed function of "deactivating the frame/door heater responsive [to anticipat[ing] formation of condensation at the display case]."

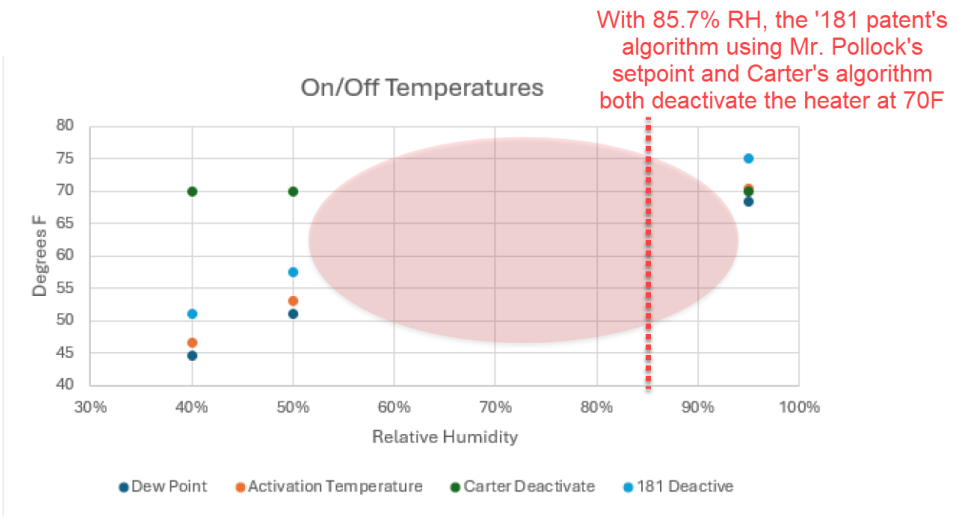
43. Given that Mr. Pollock provides no justification for his selected values, and no such justification is evident from the '181 patent, his (Mr. Pollock's) conclusion that Carter's algorithm results in "a sealing surface temperature gain of over "16°F," while the '181 patent's algorithm yields "a total temperature gain of 4.5°F" is not credible, and even misleading. EX2014 ¶57. His charts and analysis only show these different temperature gains because Mr. Pollock selected values that would produce results aligned with his conclusion that the '181 patent's algorithm is purportedly more efficient than Carter's. It is a classic case of selection bias.

44. The flaw in Mr. Pollock's approach is easily exposed. For example, by simply changing the setpoint value, one can invalidate Mr. Pollock's biased conclusion that the '181 patent's algorithm is necessarily more energy efficient because it deactivates the heater more quickly. I will demonstrate this point using Mr. Pollock's scenario with "ambient air conditions of 70°F and 50% relative humidity, [where] air has a dew point temperature of approximately 50°F." EX2014 ¶57. In this scenario, if the setpoint is changed to dew point plus 24.5°F (from Mr. Pollock's value of 4.5°F), Carter's algorithm will deactivate the heater at a lower surface temperature of 70°F, while the '181 patent's algorithm will deactivate at a higher surface temperature of about 74.5°F. Or, if the setpoint is changed to dew

point plus 20°F, the two algorithms will deactivate the heater at about the same surface temperature of 70°F.

45. One can also disprove Mr. Pollock's biased conclusion without modifying his chosen setpoint value of dew point plus 4.5°F. Instead of changing the setpoint, one can modify his selected relative humidity value—e.g., from Mr. Pollock's value of 50% to a modified value of 85.7%. For example, at an ambient temperature of 70°F and 85.7% relative humidity, air has a dew point temperature of approximately 65.5°F.[1] That means dew point plus 4.5°F (Mr. Pollock's setpoint) is about the same as the ambient temperature of 70°F, meaning the two algorithms will deactivate the heater at about the same surface temperature. Mr. Pollock's "On/Off Temperatures" chart would have revealed this fact had he not left such a large gap between the relative humidity values he selectively chose to examine. Below, I have marked this unexplored area in Mr. Pollock's chart with a large red oval and added a red dotted line to illustrate where the two algorithms would simultaneously deactivate the heater using Mr. Pollock's 4.5°F setpoint.

[1] I made this determination using well-known formulas derived from the August-Roche-Magnus approximation. *E.g.*, https://bmcnoldy.earth.miami.edu/humidity_conversions.pdf. I confirmed my determination using a psychometric chart. *See* EX1031.



EX2014 ¶56 (with annotations added in red).

46. Mr. Pollock's analysis goes on to state that Carter's algorithm "is clearly not related to the anticipation of condensation" because it deactivates the heater "when the cabinet surface temperature is equal to the ambient temperature." EX2014 ¶60. I disagree.

47. Per my Prior Declaration (EX1003 ¶120), recognizing that "providing a continuous[] supply of supplemental heat…can waste unnecessary energy and drive up the operating/maintenance costs of the freezer/refrigeration system," Carter explains that such supplemental heat "is only activated under conditions that would promote surface condensation." EX1004 (Carter), 2:4–32; *see also* 3:42–53. When ***condensation*** is no longer ***anticipated***—e.g., "[i]f the cabinet surface temperature is equal to the ambient temperature"—"the control unit will ***deactivate*** the supplemental ***heat***." EX1004 (Carter), 5:55–63, Figure 3.

48. A POSITA would have anticipated that condensation would not occur at a surface temperature heated to the ambient air temperature. Mr. Pollock appears to agree that "there is no risk of condensation on Carter's sealing surface when this area is heated far above the dew point of the air (i.e., all the way to ambient temperature)." EX2014 ¶62. Again, as noted in my Prior Declaration (EX1003 ¶123), this is because ambient temperature is always greater than dew point, unless fully saturated, particularly in controlled indoor environments like those where a POSITA would normally expect to find a refrigerated display case used for commercial purposes (e.g., a grocery store).

49. For example, a study prepared in 2004 for the federally funded Oak Ridge National Laboratory and titled "Investigation of Energy-Efficient Display Cases" notes that:

> The standard rating condition to specify the refrigeration load of a display case is for operation in an indoor environment with a 75°F dry-bulb temperature and a relative humidity of 55 percent.

EX1024 at 32; *see also id*. at 3, 19 ("Display cases are used throughout a supermarket for the merchandising of perishable food products."). At this "standard rating condition," the dew point is approximately 58°F, which is about 17°F below

ambient.[2] Or, stated in reverse, ambient (75°F) is 17°F above the 58°F dew point temperature. This buffer of 17°F is an example of what I refer to in my Prior Declaration as the "floating offset." *See* EX1003 ¶123. In the standard, common conditions for refrigerated display cases, the floating offset is a comfortable margin above dew point, such that a POSITA would anticipate no condensation when the surface temperature rises to the level of dew point plus the offset. The margin is sufficient to account for the various sensor imperfections and temperature fluctuations that Mr. Pollock identifies. *See* EX2015 ¶60 (noting sensor error up to 6+ °F), ¶65.

50. Again, as I have explained (EX1003 ¶129), the algorithms of both Carter and the '181 patent use a setpoint/offset as a buffer value to ensure that the frame temperature of the display case is far enough away from the dew point value to prevent anticipated condensation without excessive on-off cycling of the heater. Thus, I disagree with Mr. Pollock that Carter's approach to deactivation "is not dew-point-based hysteresis control." EX2014 ¶52. It is exactly that. The goal and control strategy in Carter is the same one in the '181 patent—keep the surface

[2] I made this determination using well-known formulas derived from the August-Roche-Magnus approximation. *E.g.*, https://bmcnoldy.earth.miami.edu/humidity_conversions.pdf. I confirmed my determination using a psychometric chart. *See* EX1031. My determination is likewise confirmed by the 2002 ASHRAE Handbook, which identifies the "ambient condition at which refrigeration load for food store display cases is normally rated" as "75°F dry bulb and 64°F wet bulb (55% rh, 57.5°F dew point)."

temperature above dew point using buffer values above dew point. In both cases, it is a hysteresis control scheme based on dew point.

51. Mr. Pollock argues further that "in very high humidity scenarios, such as (approaching) 100% humidity, when the dew point approaches ambient temperature, the surface temperature as heated by Carter to ambient temperature could allow condensation to occur." EX2014 ¶60. However, his premise of "100% humidity" lacks support. That is, Mr. Pollock cites no evidence to support the notion that a POSITA would expect to deploy or operate a refrigerated display case in environments with 100% relative humidity, i.e., at complete saturation. Although he mentions "an outdoor setting near where rain is occurring, such as in a stadium having refrigerated coolers for drinks," no citation to the record follows this statement. EX2014 ¶60. As I've mentioned, the evidence suggests that the typical environment for a refrigerated display case is indoors at well below 100% relative humidity. Even if it is possible to use a refrigerated display case in a 100% relative humidity environment, that does not mean a POSITA would choose to design an anti-sweat condensation control scheme around such an edge scenario.

C. The Sensor Assemblies of Carter and King

52. Claim 1 at Elements [1.a] and [1.b] requires "a frame temperature sensing unit adapted for monitoring temperature of one of the display case door or display case frame" and "a dew point sensing unit adapted for monitoring ambient

air temperature and relative humidity outside of the display case." Claim 8 at Elements [8.b] and [8.c] recites similar "adapted for…monitoring" language. I discussed these elements in my Prior Declaration, with respect to both the sensors of Carter in Ground 1A (EX1003 ¶¶82–83, ¶¶85–86)[3] and King in Ground 1B (EX1003 ¶¶166–170).

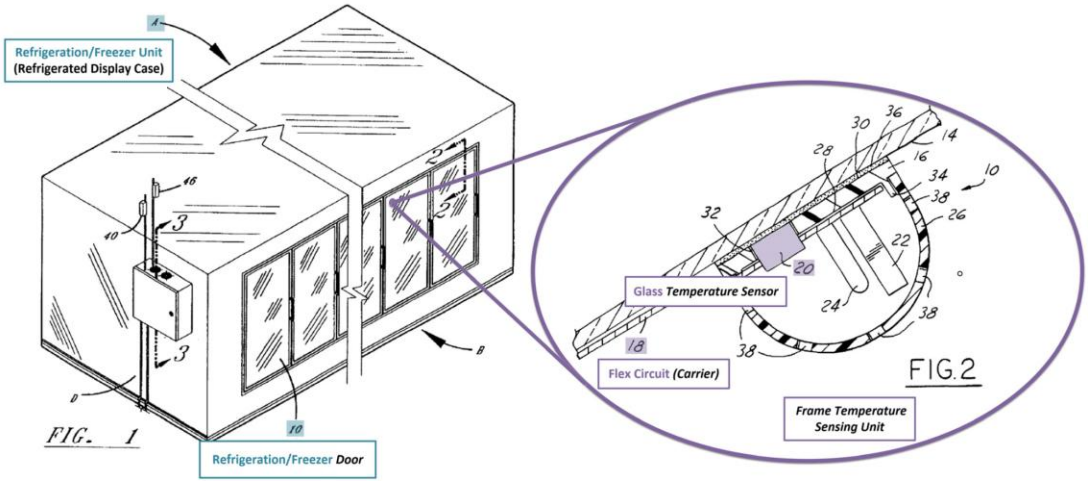
53. Mr. Pollock argues that the phrase "adapted for" means "that the claimed machine is 'designed or constructed to be used' in a particular manner." EX2014 ¶15. Although I did not offer an explicit definition of "adapted for" (and I do not do so now), the analysis in my Prior Declaration certainly applies to the definition Mr. Pollock articulated. To be clear, I did not assume in my analysis that "adapted for" refers to "mere capability." EX2014 ¶15.

54. Relating to Ground 1B (addressing claim 1), Mr. Pollock comments that the Petition for which my Prior Declaration was submitted to support does not explain how King's sensor unit "could be placed on the glass of Beatenbough" or "how [it] would be adapted for monitoring temperature of one of the display case door or display case frame." EX2014 ¶47. But Mr. Pollock is mistaken. My Prior Declaration covers this very issue quite clearly.

[3] My Prior Declaration cites back to and incorporates the Ground 1A analysis of Carter in Grounds 1D–1E for claims 1 and 8, respectively. *See* EX1003 ¶222, ¶¶243–244.

55. As my Prior Declaration (EX1003 ¶167) explains, in pursuing the Carter-Beatenbough-King Combination, a POSITA would have contemplated locating a "***sensor unit***" according to King's teachings such that the above-discussed glass ***temperature sensor*** is placed against—and, thus, ***monitors the temperature of***—the outer glass pane supported by the ***frame*** of Beatenbough's display case ***door***. Given that King discloses this sensor in the context of monitoring the temperature of a glass surface, the POSITA would have naturally thought to employ the device similarly in the Combination with Beatenbough and Carter. Additionally, the POSITA would have considered implementing King's surface temperature sensor in this way based on an understanding that the glass pane of a refrigerated display case is a location where condensation is likely to occur.

56. I continued in my Prior Declaration (EX1003 ¶168) by providing the visual aid reproduced below, which conceptually demonstrates King's sensor unit (purple) adapted for use on the refrigerated display case of Beatenbough (blue).



57. My Prior Declaration (EX1003 ¶169) further explains that it would have been an obvious alternative solution to locate a "***sensor unit***" like the one King teaches against the ***display case frame*** to monitor frame temperature, as was well known in the art and even taught by Carter. As a POSITA would have appreciated, a frame-mounted deployment would position the sensor unit more discreetly without sacrificing its functional capabilities. Stated differently, the sensor unit could still perform its intended function even if it were placed at a location along the frame of the refrigerated display case, as in Carter, instead of the glass plane, as in King. Particularly in a retail setting, customers would be less likely to see or potentially touch/damage the sensor unit in such a location.

58. As shown in the visual aid above, a POSITA would have appreciated that King's sensor unit can be adapted for use on a refrigerated display case like Beatenbough's by locating it on the door or frame in the orientation that King illustrates. Like King's disclosure, in the Carter-Beatenbough-King combination, sensor unit is located such that the surface temperature sensor (20) is exposed to and "in thermal contact with" the monitored surface and the air temperature and humidity sensors (22, 24) face the ambient environment. EX1005 (King), 2:34–60. As a result, King's surface temperature sensor is adapted for monitoring the display case door or frame, and King's air temperature and humidity sensors are adapted for monitoring the environment around the display case.

59. Mr. Pollock seems to improperly assume that merely changing the location of King's sensor unit—i.e., from a car windshield to a different surface like a glass door or a door frame of a refrigerated case—would somehow change the designed functionality of the sensors. But that assumption is unfounded. So long as the surface temperature sensor is placed adjacent to the door or frame of the display case and the air temperature and humidity sensors face the ambient environment (e.g., as I explained and illustrated above), they will fulfill their designed monitoring functionality in precisely the manner King described. This would have been clear to a POSITA from reading King, as well as from prior experience and knowledge. For example, the POSITA would have recognized that sensor packages like King's were known to be adaptable to a variety of different applications. For example, the Sensirion sensor package that I discussed in my Prior Declaration (EX1003 ¶¶45–47 (citing EX1020)), which included both relative humidity and air temperature sensors in a shared housing, was marketed as suitable for using in "High volume consumer products," "White goods," "Automotive," and "Building control & HVAC"). *See* EX1032.

60. Mr. Pollock further argues that the Petition "fails to solve fundamentally inherent problems of such place of King's sensor on the door surface of a refrigerated display case which opens and closes[.]" EX2014 ¶47. Similarly, with respect to locating King's sensor unit on the frame of the refrigerated case, Mr.

Pollock critiques the Petition for not describing specific "modifications beyond the movement of the sensor." EX2014 ¶48. He claims "additional modifications" would be required to "adapt [the King sensor unit]" for refrigerated display cases, including the "size, shape, orientation and materials of the housings." EX2014 ¶49. These critiques, however, are not well founded.

61. For one, the claim language does not require any of Mr. Pollock's so-called "additional modifications" (EX2014 ¶¶47–49); not even under his stated definition of "adapted for" as "'designed or constructed to be used' in a particular manner" (EX2014 ¶15). As I have explained, when King's sensor unit is placed on the door or frame of a refrigerated display case like Beatenbough's, the three sensors will do what King described them as being designed/constructed to do—i.e., monitor the surface temperature of frame or door, monitor the ambient air temperature, and monitor the ambient relative humidity. To the extent Mr. Pollock suggests the sensors must be modified to do more than that, he is importing limitations into the claims that are not recited. I do not see in Mr. Pollock's analysis any argument or reasoning for why the broad functional term "adapted for…monitoring" should be interpreted as incorporating his alleged additional modifications. It is particularly problematic that Mr. Pollock is referencing modifications to the housing, which is another limitation entirely in claim 1 ("housing means").

62. To the extent Mr. Pollock is suggesting that some sort of calibration or adaptation would be required to optimize the accuracy of King's sensor when placed on Beatenbough's refrigerated case, this is the sort of routine engineering task that a POSITA having three to five years of professional experience working with HVAC&R systems (*see* above at ¶¶16–29) would be well-equipped to perform. For example, the POSITA would have known that by temporarily treating the refrigerated display case door with an opaque film to increase the glass surface's emissivity, one could perform infrared thermographic imaging to characterize the glass temperature distribution along with that of the frame to determine a sensor location that balances unobtrusiveness with accuracy in measuring the coldest surface temperature, which is at highest risk of condensation.

63. My discussion above with respect to King's sensor unit on this point is similarly applicable to Carter's sensor assembly unit, which I addressed in Ground 1A of my Prior Declaration regarding the "adapted for" language.[4] *See* EX1003 ¶¶82–83, ¶¶85–86. A POSITA would have well understood that the designed functionality of the sensors in Carter's assembly would not change merely because the refrigerated case is used for purpose of displaying its contents. I detailed

[4] Again, my Prior Declaration cites back to and incorporates the Ground 1A analysis of Carter in Grounds 1D–1E for claims 1 and 8, respectively. *See* EX1003 ¶222, ¶¶243–244.

the "fundamental similarities" between Carter's refrigerated case and a refrigerated display case in my Prior Declaration (EX1003 ¶81).

64. Specifically, I explained that a POSITA would have appreciated the fundamental similarities between the refrigerated case Carter describes and the kinds of refrigerated display cases commonly found in retail stores. Both are designed to maintain perishables at a prescribed low temperature to prevent spoilage. For example, Carter explains that his refrigerated case can be used for "housing specimens requiring subjection to certain operating temperatures for one of a variety of reasons," such as "to ensure that it doesn't spoil." EX1004 (Carter), 4:3–12. Carter further explains that allowing "condensation [to] develop and/or freeze along any freezer/refrigeration sealing areas such as a gasket" can cause "the gasket…los[ing] its ability to remain flexible in order to seal surfaces completely," a result that increases the risk of multiple complications—e.g., "an inability of the freezer/refrigeration equipment to maintain a prescribed operating temperature" and "a loss of energy and time…in attempting to generate and maintain an operating temperature." EX1004 (Carter), 1:45–62. Preventing sealing failures caused by condensation, and the complications they cause, is as important in the retail food industry as any other.

D. Secondary Considerations (Objective Indicia)

65. I understand the Patent Owner's Response brief argues that "[o]bjective indicia confirm non-obviousness." POR 70. I disagree.

66. I have reviewed pages 70–71 of the Response brief, which contain the only paragraph under the "Objective Indicia Corroborate Non-Obviousness" section. I looked to see whether that paragraph cited any evidence, and saw the only citation was to Mr. Pollock's declaration at Paragraph 84.

67. I reviewed Mr. Pollock's declaration at Paragraph 84 and did not find any evidence of objective indicia regarding non-obviousness discussed there either. Instead, Mr. Pollock says that "***to the extent evidence is presented*** of commercial success, industry adoption, or long-felt but unresolved need for stable, energy-efficient condensation control at refrigerated display cases using dew-point-referenced dual set points and compact, thermally isolating housing structures, those considerations would support non-obviousness." I note that each of these features (stable, energy-efficient condensation control; dew-point-referenced dual set points; compact, thermally isolating housing structures) preexisted the '181 patent as I have described in my Prior Declaration. Thus, I disagree there was a "long-felt but unresolved need" for this technology.

68. Mr. Pollock also states that "[i]n my experience, accurate, practical, robust dew-point anticipation with reliable hysteresis at the case-level controller was

not a solved problem by 2005 and required the sort of holistic structural and algorithmic design disclosed in the '181 Patent." He does not explain what "experience" he is referring to. He also does not explain what he means by the "holistic structural and algorithmic design." However, I disagree. Accurate, practical, robust dew-point anticipation with reliable hysteresis was a solved problem in 2005. EX1003 ¶¶33–49. And the structures described in the '181 patent were also well-known, as I have described in my initial declaration.

69. Turning back to the Patent Owner response, it states that the "record reflects industry adoption of controllers implementing dual set-points and co-located, insulated-pocket housings, evidence of copying of the '181 patent's architecture, and a long-felt need to move beyond continuous heating and crude duty-cycles" with a citation to paragraph 84 of Mr. Pollock's declaration. But I do not see any discussion in that paragraph that refers to industry adoption or evidence of copying. That paragraph also does not discuss "continuous heating" or "crude duty cycles." These assertions in the Response do not appear to be supported by any evidence in the record.

70. The Response also asserts it is quoting from "contemporaneous materials" describing the '181 patent's benefits as "anticipat[ing] condensation reliably and maintain[ing] energy efficiency" and "stabiliz[ing] sensing accuracy in a compact, case-mounted housing." However, the Response provides no cites for

these quotes. It appears that the Response may be quoting from Mr. Pollock's declaration at Paragraphs 53 and 69. But Mr. Pollock's 2025 declaration is not a "contemporaneous material," and he does not cite any contemporaneous material to support those statements in those paragraphs. Thus, it is again unclear what evidence the Response relies on.

71. In short, I have not seen any evidence of any secondary considerations that would change my conclusion about the obviousness of the '181 patent claims.

72. I understand that if evidence is presented of any secondary considerations, the Patent Owner must show a nexus between that evidence and the claims of the '181 patent. I have not seen any evidence of such a nexus. To the contrary, as I have explained, the claimed elements were widely known, as demonstrated by the particularly strong obviousness grounds in this case. I provided many contemporaneous corroborating references confirming this in the background discussion of my initial declaration. EX1003 ¶¶33–49.

73. I also understand that there is a secondary consideration that can show obviousness, and/or refute other evidence of non-obviousness, namely whether there has been simultaneous invention of the subject matter of the claims. As I described in my Prior Declaration, there were a number of similar controllers on the market in the 2005 time period. *See* EX1003 ¶¶ 39–41, 49. In my opinion, the existence of these alternative controllers for this specific application in the same time period

confirms my conclusions that the claims were obvious to a person of ordinary skill in the art.

IV. CONCLUSION

74. I declare that all statements made in this Declaration of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both (under Section 1001 of Title 18 of the United States Code).

Executed this 2nd day of April, 2026.

