BECKETT SPECIAL ISSUE

APPLIANCE & HVAC REPORT

Reaching Design Engineers at the OEM Level

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Beckett Corporation is honored to be the exclusive sponsor of this edition. We aim to provide valuable resources that educate and inform our OEM customers, design engineers, and purchasing managers.

Founded in 1948, Beckett Corporation is celebrating 75 years in business, with a longstanding history of excellence in the pump manufacturing industry. We are pleased to announce that our BK221UL Condensate Pump has recently received the 2023 Dealer Design Gold Award from ACHR News, recognizing its advanced design and functionality.

Our product portfolio spans a comprehensive range of core pump technologies tailored for various OEM applications. These applications include but are not limited to portable cooling, computer room air conditioning (CRAC), commercial and residential ice machines and refrigeration, tile saws, parts washers, oil skimmers, and hydroponics.

Beckett sets itself apart from competitors through its extensive range of stock and custom pump technologies. We also offer expertise in control switches, sensors, and integration with other PCB control systems. This wide range of experience provides flexible options for OEMs and, when coupled with our in-house engineering capabilities, results in reduced costs and shorter time-to-market.

With our emphasis on quality, reduced costs, and rapid product development our experienced engineering team is positioned to assist OEM clients throughout the product origination process. Early engagement with Beckett can yield substantial benefits, from cost savings to accelerated product deployment.

We understand the importance of rapid product development cycles and offer robust in-house capabilities to reduce cycle and lead times. These capabilities give our OEM customers a competitive advantage in their respective markets.

Most of Beckett's stock pumps are UL and/or CSA listed. Additionally, we have considerable experience in working with multiple national and international regulatory agencies to ensure that our products meet or exceed the required standards.

Thank you for reading this introduction. To learn more about Beckett Corporation and our wide range of products, please visit our website at www.beckettus.com or contact me directly at (972) 607-2038.



Regards,

Allen Jerkins
National Sales Manager – OEM
Beckett Corporation
(972) 607-2038

Hello Readers:

Welcome to this Special Issue of ***Appliance & HVAC Report***, sponsored by ***Beckett Corp.***

Every business needs to evolve, to meet the needs of its audience. We are no different. As this is our 4th full year in existence we started our OEM ENewsletters back in Jan. And we also added Twitter (now X) and Linkedin to our repertoire.

And now we enter the ''book'' biz. Well not the traditional books you will find in your local library. But we consider this issue a book in the sense it has one and only one sponsor.

This 10 page volume consists of 3 tech articles previously published and deployed to our audience. But now you have them all here. Here are their titles:

- The Ultimate Guide to HVAC Condensate
- Condensate Pumps for Computer Room Air Conditioning
- Top 10 Questions for Vetting New Suppliers

Besides having received this as part of our database of subscribers, you will also be able to access it via our website and our OEM enewsletter.

While we remain a quarterly brand, we will be sending these ''books'' to you every so often. Hope you like them and let me know what you think, at brad@appliancehvacreport.com.

And we'd like to give a shout-out to the folks at ***Beckett Corp.*** for moving forward with this project.



Brad

Founder & Publisher
Brad Glazer
Appliance & HVAC Report
(216) 233-6943
brad@appliancehvacreport.com

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Brad Glazer
Founder & Publisher
brad@appliancehvacreport.com
(216) 233-6943

Jeff Greene
Art director
jeff.greene1116@gmail.com

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The Ultimate Guide to HVAC Condensate

BY JOSE LEON AND RUSSELL NELSON

Unless you're an experienced HVACR professional, most people don't realize that air conditioning, refrigeration, and other HVACR equipment can produce condensate during normal operation.

This article is intended to help provide a basic understanding of condensate, condensate removal, and condensate-related problems in HVAC systems. Ready to learn more, let's dive in!

Key Takeaways

- All air conditioning systems produce condensate during normal operation
- Condensate must be drained or pumped from systems to avoid costly damage
- Condensate pumps, drain pans, and drain lines require routine maintenance
- Condensate overflow and leaks can cause water damage, mold growth, and unpleasant odors
- Some condensate is corrosive and requires treatment

What is Condensate?

Condensate is created during a change in the state of water from a gas or vapor form into a liquid form. It generally occurs when vapor in warm air encounters a cool surface, which normally occurs in air conditioning systems, refrigeration equipment, and other types of cooling and heating equipment.

To prevent the unwanted collection of condensate water, it should be drained away by gravity through a drain pipe or hose. If gravity drainage is not possible, a condensate pump is used to automatically pump the condensate water to a drainage point or sewer drain.

Other types of equipment that produce condensate include condensing boilers, high-efficiency furnaces, dehumidifiers, ice machines, grocery store refrigeration/freezer display cases (dairy, meat, produce, etc.), convenience store refrigerated beverage display cases, walk-in refrigerators and freezers, steam humidifiers, industrial air dryers, and tankless/instant water heaters.

Where Does Condensate Naturally Occur?

IIn addition to the variety of equipment that produces condensate, condensate also occurs naturally in our daily lives:

- Morning dew in our garden/lawn
- Early morning moisture beads on car windows
- Sweaty droplets on your can or bottle containing a cold beverage
- Water droplets or steamy bathroom mirrors
- Visible breath in cold winter conditions
- Clouds in the sky or fog in the air
- Fog or moisture on glasses and goggles

How Does Condensation Relate to Evaporation?

The two terms are related, but they have opposite meanings. While condensation occurs when a gas or vapor changes into liquid form, evaporation happens when a liquid substance changes to a gaseous form. For example, when the morning dew burns off, it does so through the process of evaporation.

- Process of ironing damp clothes
- Process of sweating by the human body
- Line drying clothes
- Whistling steam from a stovetop kettle
- Puddles drying up
- Melting of a glass of ice

Is it Normal For HVAC Systems to Produce Condensate?

Yes. The same process that causes a cold glass of iced tea to form water droplets on its exterior in the summer causes condensation in your air conditioner and other similar equipment.

During normal operation, the evaporator coils of your air conditioning system cools the warm air that passes over it, absorbing heat and moisture from the air, and condensation naturally forms. As the condensation drips off the evaporator coil it then collects in your system's drain pan and eventually drains through the condensate drain line via gravity or to a condensate pump (assuming it's properly maintained and not clogged).

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Common Issues With Condensate Water in HVAC Systems?

Condensate-related issues can range from high humidity levels that lead to mold and mildew proliferation and structural damage from drainage water that accumulates and puddles in areas where it does not belong. These issues are typically caused by one of the following problems.

Condensate Drain Pan Problems - Under normal operation, your A/C drain pan collects condensate from the



evaporator and sends it to an external drain. However, after years of use, condensate drain pans can corrode or crack leading to water leaks into the A/C unit and excess condensate below the drain pan causing damage to the A/C unit and your home or commercial building.

Clogged or Dislodged Drain Line - If bacteria and fungus build up in the drain line, it can become clogged. It is also common for drain lines to become dislodged or outdoor drain lines to become obstructed. When this happens, your condensation pan is plugged and can overflow, causing damage.

Broken Condensate Pump - In homes and commercials building with basements or attics, an automatic condensate pump assists in the removal of condensate water from the system. If the pump is not properly maintained, becomes plugged or fails, condensate water can overflow or leak causing damage.

Dirty Air Filter Leading to a Frozen Evaporator Coil - Dirty HVAC system air filters restrict adequate airflow over the evaporator coil. Without proper airflow, the coil can get too cold and freeze. When this ice melts, dripping into the condensation pan, it can overflow due to the excess volume.

In Simple Terms, What is a Condensate Pump?

Condensate pumps are designed to move the condensate water produced by moisture-prone equipment (e.g. air conditioner, furnace, refrigerator, ice machine, etc.) to a holding tank before removing it to a drain or sewer. The holding tank collects the condensate liquid until it rises to a level that raises an internal float switch which automatically activates the pump until the liquid level in the tank is lowered.

How Do Condensate Pumps Work?

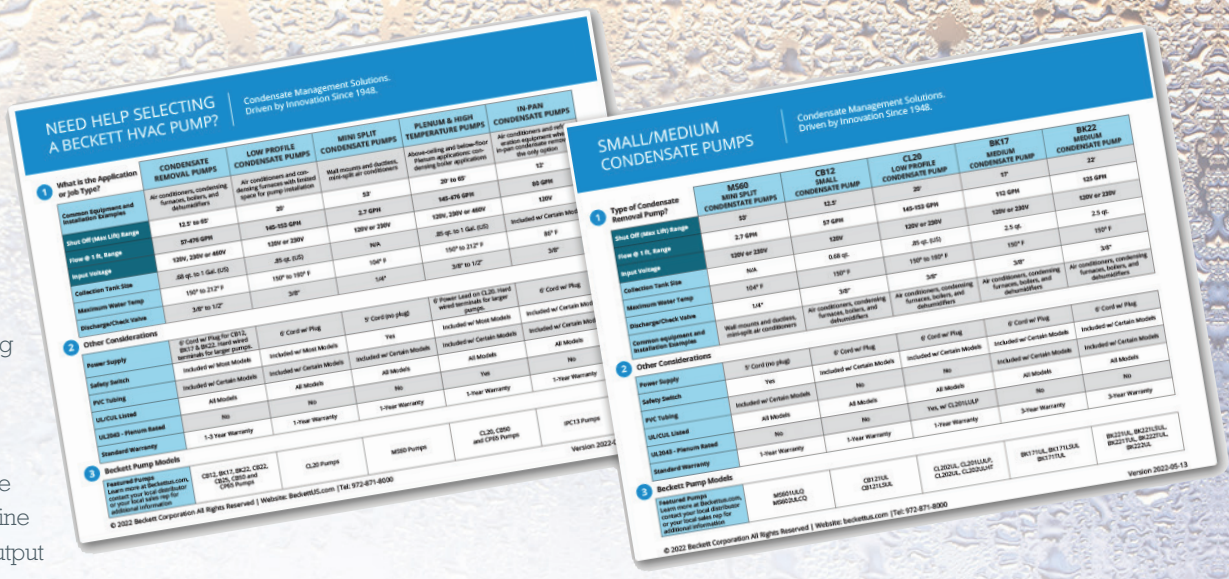
Most condensate pumps have a main float switch to automatically start/stop the pump when the water reaches preset levels inside the pump reservoir. The pump will automatically turn on/off when the water level increases/decreases in the reservoir or tank. Some pumps also feature a safety switch that can be wired to the condensate source (air conditioner, furnace, refrigerator, freezer, ice machine, etc.) to automatically shut off the source equipment in case of a blocked discharge line or pump failure.

Choosing a Condensate Pump

The first step in choosing the right condensate pump is to determine if your application is subject to local condensate handling and disposal regulations. Select a model that operates within these guidelines.

Next, determine the lift required for the pump by identifying where the pump will be mounted and where the discharge or drain point will be. Condensate flow will decrease in





accordance with the height it must travel until the maximum lift, or "shut-off" lift is reached. Select a pump with a maximum lift rating that is suitable for your application.

Check your equipment service manual to determine the condensate output and choose a pump with sufficient capacity. As a general rule, the output flow of the pump should be at least double the input rate from the appliance.

Ascertain your voltage requirements. Most pumps are available in 120V or 230V models. Some commercial-grade pumps are available in 230V and 460V.

If property damage or personal injury can result from an inoperative or leaking pump, choose a condensate pump with an overflow shutoff switch or install one with your pump.

Unless you're replacing an existing condensate pump, it is strongly recommended that you contact an HVAC professional to properly size and select a condensate pump for any new application.

What Are The Risks of Not Properly Disposing of Condensate in HVAC Systems and Other Equipment?

When condensate water is not properly removed from a system it can overflow or leak, causing a range of problems and damage.

- Water damage due to overflowing condensate pans or plugged drain lines
- Damage to HVAC equipment and surrounding structures
- Mold, algae or scale buildup leading to foul odors and plugged drain lines
- Mold and mildew growth due to excessive moisture and leaks
- Equipment and pipe corrosion related to untreated corrosive condensate

How Much Condensate Does an Air Conditioner, Furnace or Other Cooling Equipment Produce?

It depends on the application, size, and type of equipment. Normally, the amount of condensate that drains from an A/C system can range from 5-20 gallons per day, depending on its size, how long the unit runs and how much moisture is in the air.

Properly designed and maintained systems should easily drain the condensate via a gravity drain line or an automatic condensate removal pump. However, problems and damage can occur when condensate overflows or leaks occur due to lack of maintenance or equipment failure.

What Type of Condensate Can be Corrosive?

Conventional furnaces and A/C systems do not produce corrosive condensate because the combustion gases are sent directly to the flue from the combustion chamber. However, in high-efficiency condensing furnaces, the exhaust gases are passed through a second heat exchanger which in turn produces a corrosive condensate.

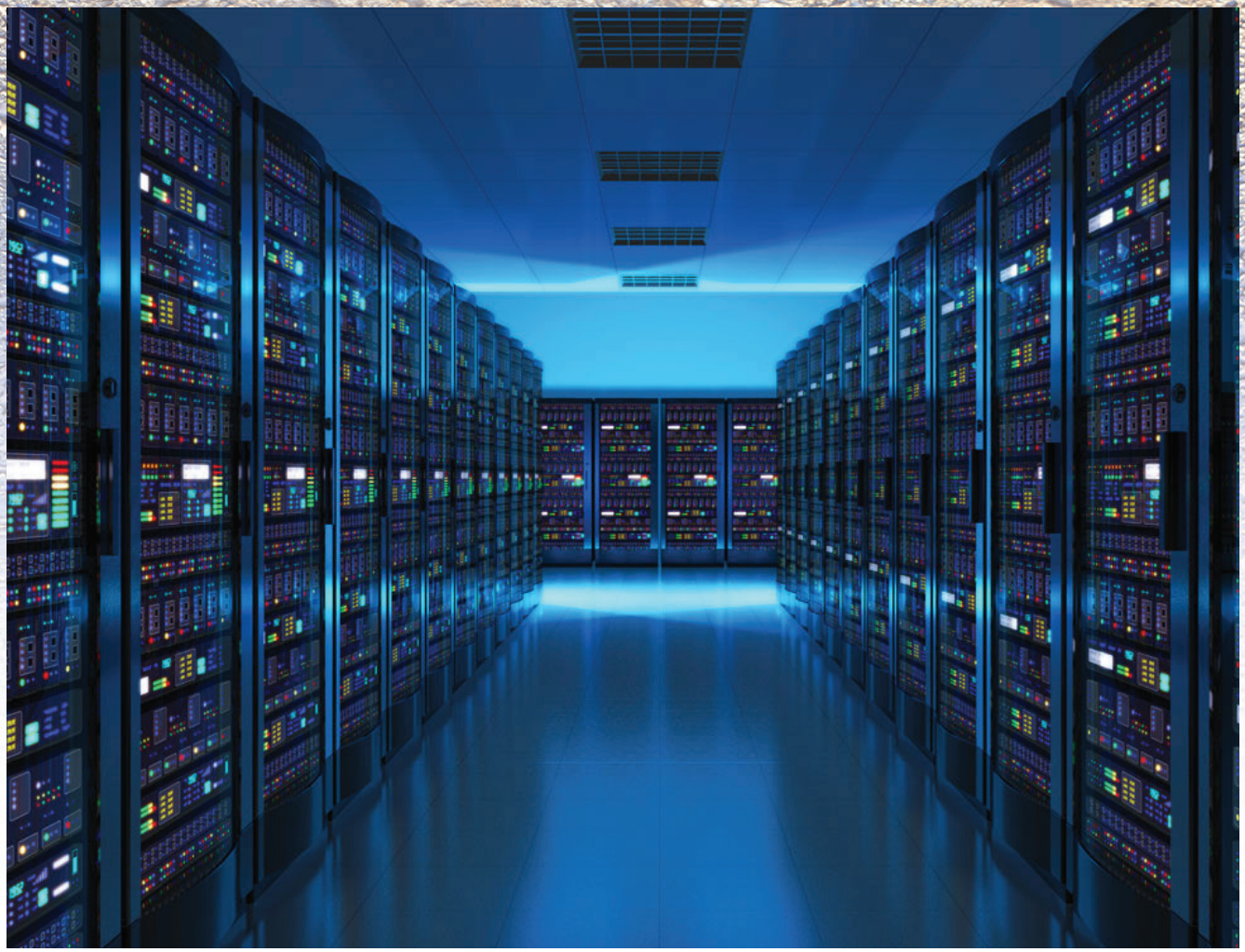
These hot gases get a chance to cool down within the condensing furnace system so no heat goes to waste (e.g. high-efficiency). When the temperature of the combustion gases drops, they condense and form a condensate that is usually corrosive, requiring treatment or neutralization before being passed into a drain or sewer line. ●



Jose Leon *is a Senior Project Manager of Engineering at Beckett Corporation. Jose has a B.S. Degree in Mechanical Engineering from the University of Texas and extensive training in ISO 9000 Quality Management. For over 23 years, Jose has worked with Beckett's product management, product engineering, and manufacturing teams.*



Russell Nelson *is the OEM/HVAC Product Manager at Beckett Corporation. For over 30 years, Russell has worked in the water pump industry in various capacities, including 15 years in product management specializing in new product development. His expertise and tenure within Beckett's engineering department provides an invaluable resource to the company and its customers.*



Condensate Pumps for Computer Room Air Conditioning

This case study explores Beckett Corporation's extensive experience working with OEMs of data center cooling systems to deliver stock and semi-custom condensate pump solutions for manufacturers of Computer Room Air Conditioning Systems (aka CRAC).

When it comes to component reliability, performance, and cost effectiveness, CRAC OEMs are continually exploring new options for major components, including condensate removal pumps.

Due to confidentiality agreements with OEMs, we are not able to share specific de-tails on any manufacturers, models or specific application details in this article. Why do computer rooms and data centers need air conditioning?

Poorly managed computer room temperature, humidity, and air quality can negatively affect the performance and lifespan of computer equipment and put priceless data at risk. To protect servers and data, specialized HVAC equipment is essential to monitor and control temperature, humidity, and air quality in computer rooms, data centers, and server farms.

What is Computer Room Air Conditioning (CRAC)?

A CRAC unit is similar to traditional air conditioning equipment. It is designed to maintain the temperature, air distribution, and humidity in a data center's computer rooms. CRAC units use a direct expansion refrigeration cycle. Air is cooled by blowing over a cooling coil. The cooling coil is filled with refrigerant, which itself is kept cool by compression. The extra heat is ejected using a glycol mix, water, or ambient air.

Why do CRAC systems need condensate pumps?

Condensate is created during a change in the state of water from a gas or vapor form into a liquid form. It generally occurs when vapor in warm air encounters a cool surface, which normally occurs in air conditioning systems, refrigeration equipment, and other types of cooling and heating equipment.

To prevent the unwanted collection of condensate water, it should be drained away by gravity through a drain pipe or hose. If gravity drainage is not possible or practical, a condensate pump is used to automatically pump the condensate water to a drainage point.

What are the main components of a CRAC Unit?

The major components of most CRAC systems can include mechanical items, monitoring/ controls, refrigerants, air filters, compressors, evaporator coils, and condensate removal pumps. The actual components vary based on the make, model, and size of the CRAC system.

Are CRAC and CRAH (Computer Room Air Handlers) the same?

No. CRAH cooling units have a similar function to chilled water air handling units in buildings. Like CRAC systems, these units use fans to blow air over cooling coils to remove excess heat. However, these cooling coils are filled with chilled water rather than refrigerant. The chilled water typically comes from a separate chiller or chilled water plant. The unit draws in warm air from the computer room, and the air flows over the chilled water coils. Heat transfers from the air to the water, which then returns to the chiller. CRAH units can regulate fan speed, ensuring humidity and temperature levels stay stable while also allowing variability.

CRAH cooling is typically used in mid-to-large-sized data centers and server farms. Because CRAH units don't use compressors, they typically use less energy, are more efficient and require less maintenance, all of which can also mean lower operating costs. However, CRAH systems include a significant capital investment because they're designed for medium to large data centers.

CRAC OEM Problems

Beckett works with CRAC OEMs during projects related to new product development and existing product improvements. OEMs explore alternative pump solutions for a variety of reasons.

- Pump reliability and durability issues
- Pump performance problems
- Unacceptable pump operating noise
- High temperature requirements from steam humidifiers
- Tight dimension requirements from low profile or aisle/row/rack cooling
- Plenum rated pumps for placement in plenums or ducts due to space limitations
- Uncompetitive pump price points
- Unresponsive or inflexible engineering and technical support
- Issues related to supply chain and product availability
- Slow time to market capabilities

Solutions and Benefits for CRAC OEMs

With over 75 years of experience, Beckett offers a range of stock and semi-cus-tom condensate pumps to meet a wide range of applications at a cost-effective price point. With in-house engineering and production, Beckett offers a range of high-quality condensate pump solutions.

Beckett's extensive OEM experience backed by a range of important capabilities makes Beckett condensate pumps the ideal solution for many CRAC manufacturers.

- Proven Pump Technologies - With a range of stock pump technologies, Beckett can meet different needs with proven high-quality condensate pumps at a competitive price point. In addition, Beckett can assist with control switches and integration with other control systems. The Beckett IPC13, CL20, BK22, CB25 and CB50 condensate pumps have been used in a wide variety CRAC applications including but not limited to high-temperature, plenum, and low profile applications.
- In-House Engineering - Our technical resources are available for assistance with prod-uct sizing, selection and semi-custom applications.
- In-house Production - Ensures a more reliable supply chain, lower tooling costs, faster cycle times, and overall greater flexibility to meet your needs.
- Time to Market - Beckett understands the need for speed and flexibility. Our in-house capabilities shorten cycle times and lead times to give our OEM customers another advantage.
- Production Tooling - In rare cases where custom tooling is needed, Beckett offers more affordable tooling and shorter lead times to help keep costs down.
- Experience - Since 1948, Beckett has built a proven track record for producing high-quality pumps known for reliability, long-term durability, quiet operation, and great overall value. ●

TOP 10 Questions

FOR VETTING NEW SUPPLIERS

Choosing a pump supplier for your OEM project can be a daunting process. Given the high cost of making the wrong decision, it's essential that OEMs use a detailed process to screen and compare candidates in order to select the ideal supplier/partner. Using our list of top 10 questions, this article is intended to provide a basic framework for OEMs to identify and assess pump suppliers that best fit your needs and requirements.

Key Takeaways

- Focus on suppliers that can add skills and expertise that you don't have
- Focus on suppliers with in-house engineering and manufacturing capabilities
- Focus on suppliers that are flexible, cost-focused, and understand the importance of time-to-market
- Look for suppliers with a proven track record in your product category

1. What type of OEM experience do you have?

With decades of experience, Beckett has a wide range of core pump technologies and works with a broad range of OEM applications including specialty HVAC/R equipment, computer room air conditioning equipment (CRAC), commercial and residential refrigeration equipment, commercial and residential ice machines, tile and masonry saws, parts washers, oil skimmers, hydroponics equipment, evaporative cooling equipment, and others.

2. What is the scope of your pump product offering?

Beckett offers a broad range of fractional horsepower centrifugal pumps including stock, semi-custom, and custom pumps. Beckett also offers a limited range of piston and diaphragm pumps. These pumps include a wide range of submersible pumps, bottom intake pumps, and a variety of small, medium and large condensate pumps (i.e. high-temperature, low-profile, plenum rated and more). Typically, the top factors that drive the pump selection process for OEMs are 1) application suitability, 2) performance criteria, 3) price point specified by the OEM.

3. What is your experience with addressing cost and quality challenges?

Since its founding in 1948, Beckett has built a seasoned engineering team to help OEM customers address cost and quality challenges during the product development process. Customers see the most value by engaging Beckett early in the product development process to explore key factors that can impact cost, improve quality and shorten the time-to-market window.

Beckett has achieved ISO 9001:2015 certification, meaning we are a manufacturing organization that has demonstrated the following:

- Follows the guidelines of the ISO 9001 standard
- Fulfills its own requirements
- Meets customer requirements and statutory and regulatory requirements
- Maintains documentation



4. Beyond pumps, can you help with controls, sensors or other integrations?

Compared to other suppliers, Beckett's broad range of stock, semi-custom, and custom pump technologies helps keep costs lower and time-to-market shorter. Furthermore, Beckett's experienced in-house engineering team can also assist with control switches, sensors, and integration with other PCB control systems.

5. Do you have an in-house engineering team to assist with our project?

Beckett's experienced in-house engineering and manufacturing team can help expedite many aspects of your project: design, prototyping, testing, tooling, sourcing, production, and inventory to meet your requirements and speed-to-market window. In many cases, we are engaged early in the development process because of the additional value we can provide.

6. Do you manufacture your own pumps or outsource production?

Beckett manufactures the majority of their products and only outsources certain components. This approach ensures OEMs a more reliable supply chain, lower tooling costs, faster cycle times, greater quality control, and greater overall flexibility to meet your needs.

7. If needed, can you assist with custom tooling for our project?

In some cases, custom tooling is required for OEM projects, which can sometimes add big costs and significant delays. Because of our extensive in-house engineering and manufacturing capabilities, Beckett offers more affordable custom tooling and shorter lead times to help keep costs down and avoid extended delays.

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8. Do you offer any type of reliability or performance testing?

Absolutely. Beckett offers an extensive range of testing capabilities as part of our product development process for OEMs. This includes performance, reliability, and life testing, as well as others based on OEM needs and requirements.

9. How does your approach improve or hinder the project's overall speed-to-market?

Beckett understands the need for speed and flexibility. Our in-house capabilities shorten cycle times and lead times to give our OEM customers another advantage when it comes to speed-to-market.

10. Do you have experience with UL, CSA, and other safety regulatory agencies?

Practically all Beckett stock pumps are UL and/or CSA listed. We have extensive ex-perience working with various national and international agencies to get products listed/approved (UL, CSA, CE, TUV, NOM, NSF and others).

Other Beckett Resources

- The Ultimate Guide to HVAC Condensate and Condensate Pumps
- The A-Z Guide to High-Temperature Condensate Pumps
- Condensate Pumps for Computer Room Air Conditioning (CRAC)
- Beckett Pump Selection Brochure
- Beckett OEM Pump Catalog
- Beckett OEM Product Resources