mechanicalservicecorporation

TECH TALK

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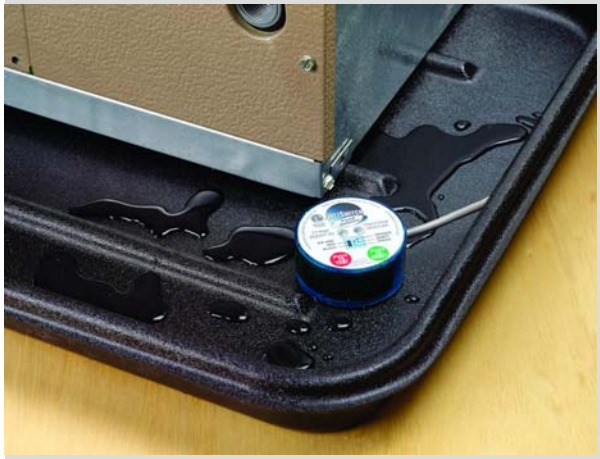
NEWSLETTER - OCTOBER 2016

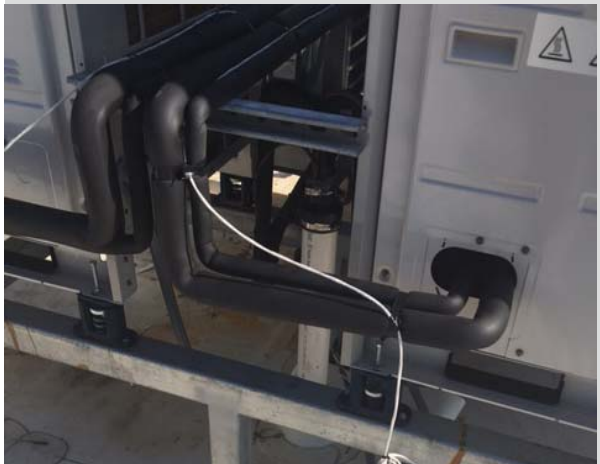
973-884-5000

SERVICE CALLS

Condensate- Blocked or obstructed condensate can cause significant flooding, so many installations are equipped with level switches that alarm and shut down systems when potential overflow is detected. When MSC was called in to investigate high temps in a facility's MDF and IDF, techs found that level switches had been mounted incorrectly, causing false readings, as well as alarms that had never been connected.



Shut Downs- Shortly after more than 200 heat pumps were installed on a large project, multiple units began shutting down due to various control faults. MSC was called in and quickly discovered that the contractor had neglected to obtain and install hard-start kits and solenoids recommended by the manufacturer when the heat pumps were purchased. Lesson learned: always make sure you read the paperwork.



VIBRATION, FREQUENCY & RESONANCE

Occasionally when MSC is challenged to determine the cause of excessive vibration in equipment such as fans, compressors and pumps, a phenomenon known as resonance is found to be at play.

To understand resonance, we first must understand natural frequency, which is the specific rate at which an object will vibrate when excited by a single force or impulse. Resonance occurs when the object is exposed to vibrations of a frequency matching its own natural frequency, causing an amplification of these vibrations. Resonance is the force at work when a singer shatters a crystal glass by holding a note at the same frequency as the glass, or when an idling truck parked outside a building causes a water cooler inside to vibrate, because the cooler is in resonance with the truck's engine. Resonance can also occur at multiples of an object's natural frequency.

Critical speed, another important term to understand when it comes to resonance, is defined as the angular velocity that excites the natural frequency of a rotating object. All rotating shafts, no matter how well-balanced, deflect during rotation, creating resonant vibrations at critical speed. Manufacturers of rotating equipment calculate approximate critical speeds during the design phase and advise end users to avoid this value by ±20%. This range can be narrowed by conducting a vibration survey of the installed equipment to pinpoint the actual natural frequency. Equipment operated above critical speed should be monitored and controlled to pass through this band quickly during acceleration and deceleration to prevent damage to bearings, seals, blades, and shafts.

Structural resonance, which is the excessive vibration of non-rotating components or supporting structures, is a condition that can arise when rotating components are operated at the structure's resonance point. Structural resonance can be controlled by modifying the stiffness or mass and increasing damping to absorb vibratory energy and change the natural frequency of the structure. With both structural resonance and critical speed, protections can be wired into the control panel to shut down equipment experiencing severe vibrations.

INSIDE...

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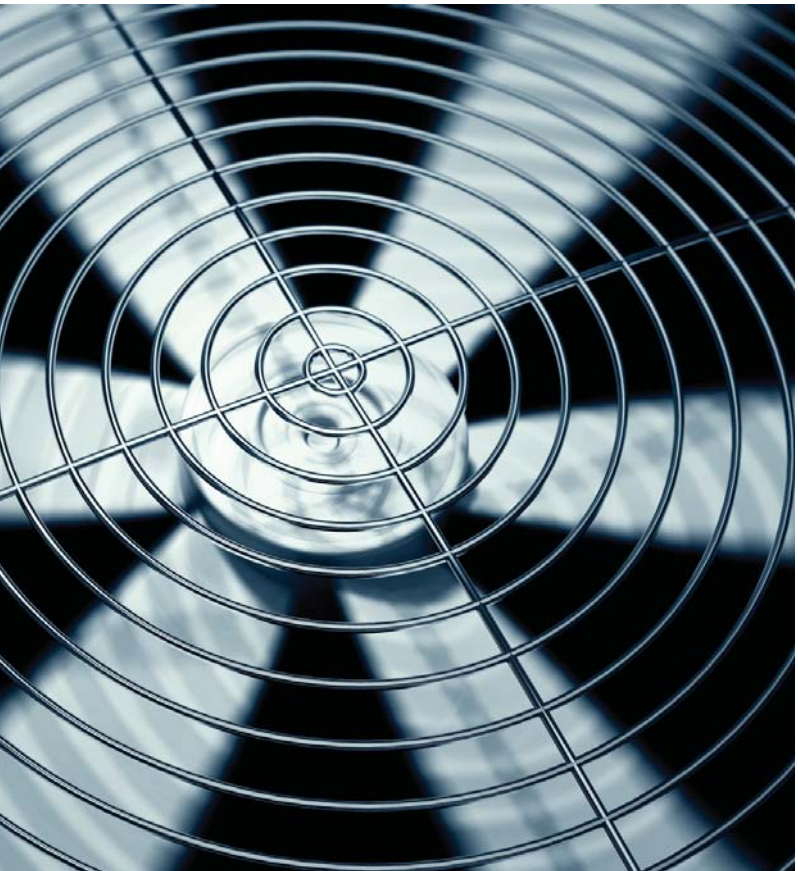
AVOIDING THE PITFALLS OF LOW QUALITY PARTS

“They don’t make ‘em like they used to” is a common refrain in the HVAC industry. Parts and equipment are made with thinner metal, weaker plastic, lower-quality forging, and cheaper electronics. This endless quest to manufacture the least expensive product means that overall quality inevitably suffers, and it is increasingly difficult to find good-quality products at what is perceived as a “reasonable” cost. Case in point: MSC recently installed two packaged RTUs at a manufacturing facility and due to a moderate budget, the contract included custom installation of reinforcements in the all of the access panels due to their flimsiness. In another instance, an OEM contactor for a 10-ton A/C compressor was quoted at an impossibly-low price of $14.00. Imagining the poor quality of the assembly, MSC opted for a replacement at a higher but more-realistic cost.

Another common manufacturer “trick” is to use slightly-undersized motors to get a higher energy rating on their equipment, which is then sold at a lower cost. Not surprisingly, this results in more frequent motor failures. Other manufacturers have eliminated components like crank case heaters in compressors to keep prices deceptively low. This is not to say good-quality parts and equipment can’t be found. On the contrary, many manufacturers still produce merchandise that lasts longer and performs better than a competitors’ product, but these items are harder to find and cost more, making it difficult for decision-makers to justify differences in cost. Unless an unlimited budget is at your disposal, it might not be possible to purchase the best products available, but there are a number of ways to go about getting the best your money can buy.

Seek the input of a service specialist like MSC, as well as that of your own facility maintenance personnel, when purchasing HVAC equipment for a construction or renovation projects, as projected cost of maintenance and repairs over the lifetime of sub-par equipment often far outweighs the initial purchase price. Be wary of installing contractors who may be more invested in getting done and getting out than preventing costly service issues down the line. Conversely, a disreputable service company could potentially profit from repeat calls, so always make sure these contractors are thoroughly vetted as well.



If commercially-available HVAC equipment is not up to snuff, reputable contractors like MSC can custom-build units using more rugged components such as coils, motors, and contactors. Also, off-the-shelf equipment can often be modified to meet quality standards, though this may affect the manufacturer’s warranty. As for replacement parts, MSC’s best advice is to be wary of OEM, which more often than not are a) less expensive, and b) sub-par. Though their lower prices can be tempting, OEM parts tend to fail prematurely, and repair costs can be far more costly than the part itself. A quality contractor like MSC can help determine your best option, which may or may not be an OEM part. The principle of “caveat emptor” should be liberally applied when choosing parts and equipment, and MSC can help clients make best-value parts and equipment choices based on both budget and specific needs.

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MOISTURE INFILTRATION & EVACUATION

Moisture, whether in liquid or vapor form, is the enemy of any refrigerant system. As little as a single drop of water can wreak havoc by reducing compressor efficiency, damaging system components, and possibly leading to compressor failure. Moisture enters a system easily and can be difficult to remove.

A common sign of moisture contamination is freezing in the expansion valve that blocks the flow of refrigerant. Moisture can also react with refrigerant to form acids that can corrode metals and cause copper plating. Lubricants – synthetic POEs in particular – can absorb moisture when exposed to the atmosphere, causing sludge to develop in the oil. Sludging can clog strainers, expansion valves, and capillary tubes, and reduces the oil's lubricating ability.

One of the most common causes of moisture infiltration is improper evacuation of the refrigeration system during manufacturing or installation. A high vacuum pump lowers pressure in the system to allow water to boil at atmospheric temperature, then draws the vapor through the pump. If the vacuum is not deep enough, or if the pump is not left on long enough, moisture can remain in the system.

Moisture can also enter a leaky system that is less than air-tight, allowing moisture to enter at openings. Refrigerant and lubricants must be handled properly to avoid exposure to outside air. Refrigerant dryers can malfunction or become saturated. Water can even leach from elastomeric or plastic components at elevated temperatures.

As mentioned, the way to remove moisture from a refrigeration system is to evacuate the system with a vacuum pump to reduce pressure and increase the boiling point of water. There are several factors that influence the time required to remove all moisture, including the type, internal restrictions, and size of the system, the amount of moisture present, the ambient temperature, and external restrictions between the system and the vacuum pump. Service technicians who are trained in evacuation can make the proper determinations and ensure complete dehydration of a system when the procedure has been completed.

DID YOU KNOW...

- As the recognized industry leader in HVAC, process cooling, and building automation diagnostics and service, MSC technicians receive continual technical training, participate monthly in monthly in-house workshops, and regularly attend vendor training seminars. This ensures that every client receives the top-echelon expertise, quality, service and professionalism they deserve.