NEWSLETTER - SEPTEMBER 2021

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TECH TALK

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SERVICE CALLS

MSC received a no-cooling call from a lab where a bad connection on a chilled water pump VFD caused wiring and part of the drive to burn up. Despite ongoing pandemic supply issues, we located a 25 hp replacement drive and had it onsite within hours. We switched the system over to the lag pump, installed the new drive, and restored full cooling capabilities to the facility that same day. Both VFDS were tested and commissioned to ensure proper operation.

Workers returned after a 3-day weekend to find local alarms for a walk-in box sounding and the irreplaceable product inside ruined. MSC found that the condenser water system had gone down early in the weekend and emergency city water back-up had failed. Why? The back-up valve had been turned off. BAS alarms didn't work and it appeared they'd never been tested. MSC removed the manual valve handles, properly terminated the alarm wires, and tested the system.

Apples and Oranges, Fords and Lamborghinis:

Our advice on how to avoid choosing the wrong contractor for your project

Cleanroom temperature and humidity were fluctuating wildly during system commissioning on a recent laboratory construction project, and the installing contractor's **efforts to correct the problems only seemed to compound them**. Costs were piling up, and it soon became clear that the project had gone completely off the rails. **MSC was called in to fix the issues caused by the contractor** and get the commissioning process back on track, which we accomplished over the course of five days (including a few double shifts).

It should have been obvious from the get-go that **the contractor was underqualified for the mission-critical project at hand**, but the owners had failed to budget based on their building's specific HVAC system needs and this particular company came at a bargain basement price. It all boiled down to a classic mistake: **the client didn't fully understand their own system requirements and had done their shopping in all the wrong places**. Now they were paying a high price and had to hire a new HVAC contractor to replace the original one.

Don't assume they'd learned their lesson, however, because the replacement company hadn't been properly vetted, either, and wasn't much better than the first. Issues that cropped up when commissioning resumed snowballed, progress ground to a halt once again, and MSC was called back for the second time in less than a month to fix a whole new set of problems that could have been avoided.

Here's the lesson. Construction budgets are what they are, but building owners must understand that there are significant differences between a standard HVAC system and one that serves a mission-critical environment. Likewise, all mechanical contractors are not the same, and complex projects demand installers of a higher caliber. **Budget accordingly and compare apples to apples** when choosing between contractors, or expect to pay dearly in time, money, and headaches.

Think of it this way: if you own a Ford or Honda and it needs service, a bargain auto repair franchise might be a perfectly acceptable choice. But would you entrust them with a German luxury car, or vintage Thunderbird, or Lamborghini? Of course not. Building owners taking on a major construction project need to figure out whether their HVAC system is a **Ford, a Lamborghini, or something in between** and apply these standards when narrowing down their mechanical contractor choices.

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CHILLER SURGE: What Causes It, How to Prevent It

Chiller surge is a condition that occurs in centrifugal chillers in which refrigerant flows in reverse from the condenser back to the compressor, which can lead to severe damage.

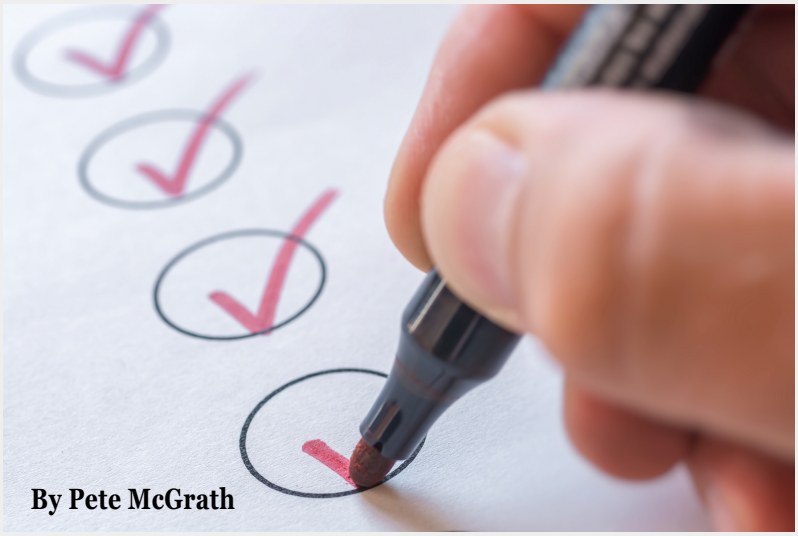
What is surge?

Each chiller system has a maximum lift, or head pressure, which is the difference between condenser refrigerant pressure and evaporator refrigerant pressure. Lift can also be measured by the difference between the leaving chilled-water temperature and the entering condenser-water temperature. If this differential increases to where it exceeds the system's pumping capacity, refrigerant will flow backward through the compressor wheel every few seconds. Pressure builds up in the compressor, causing the refrigerant to surge forward again, and the cycle repeats. This reverse-load can damage the thrust assembly, bearings and gearbox, and can cause a rupture in the safety disc or blow the relief valve.

Surge is identifiable by its loud, distinctive sound, sometimes likened to an elephant's squeal or a surging jet engine, as well as a fluctuation in compressor amperage.

How to prevent surge

Chillers are designed to meet specific system requirements and operating conditions. With proper maintenance and operation within design intent, a properly selected chiller will not surge. Changes in operating conditions, however, can cause surge to occur, particularly under low load conditions. Surge can be attributed to maintenance issues including fouled tubes, low refrigerant charge, or non-condensables in the refrigerant. It can also be caused by poor control of water flow rates and condenser water temperatures. Low load issues surge issues can be avoided or corrected with hot gas



By Pete McGrath

"But is it *done*-done?"

This is a question clients sometimes ask us at MSC when we say a job is done.

It's understandable. Other folks might answer that question with, "it's done, we just have to get the final inspection", or, "it's done, we just need to send the as-builts". This is how many contractors end up leaving loose ends on projects and never really finish the job 100%.

What we're taught at MSC is that things are either done, or they're not. Those are the only two choices.

At MSC, done means done.

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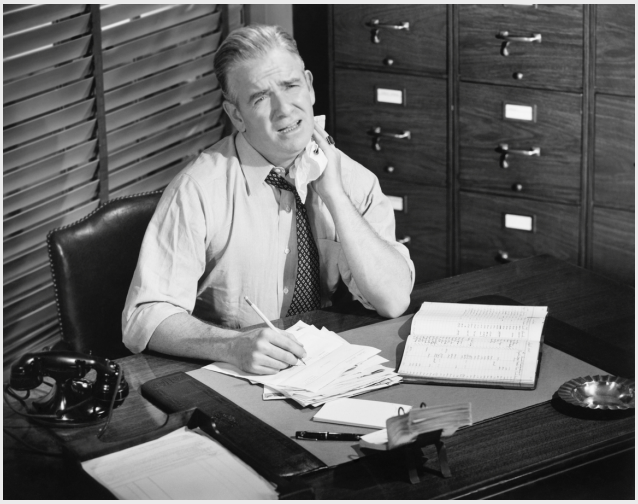
Lament of the Pre-A/C Era Office Worker: I'M MELTING!



Few of us are old enough to remember when air conditioning was a novelty and most buildings became suffocatingly hot during summer. Sure, we've all imagined what it must have been like in those days for people who worked indoors, but you might be surprised at just how miserable the conditions could actually be.

According to an article in the Washington Post, it was the Civil Service Commission that set the rules determining when federal employees could be sent home due to excessive heat. Dismissal was only allowed when temperatures hit 95°F, but only if humidity reached a certain level. Here are the sadistic temperature/RH minimums set by the CSC:

- 95°F at 55% RH
- 96°F at 52% RH
- 97°F at 49% RH
- 98°F at 45% RH
- 99°F at 42% RH
- 100°F at 38% RH

In other words, employees weren't allowed to leave work until temperatures reached conditions that were equivalent to a **109°F heat index**. Incredibly, because air conditioning didn't become common in government buildings until the mid-50s, this policy remained in effect until the early 1960s. Let's count ourselves lucky to live in the era of A/C.

Bad Electrical Connections Could Be Causing Your System Problems

When electrical anomalies occur, loose, over-tightened, or corroded connections are often at the root of the problem. Effects of a bad connection can range from annoying (intermittent interruption) to costly (critical system failure), to catastrophic fire or explosion.

By nature, electrical components begin to deteriorate as soon as they are installed, so whether a connection is compromised by faulty installation, vibration, fatigue, or environmental conditions, they're all eventually destined to fail. Periodic inspection and tightening of electrical connections is often prescribed as part of a facility's maintenance program, but it is important to note that simple retightening is oftentimes not the appropriate corrective action. Overtightening can compound electrical problems, and contact surfaces that have become oxidized, dirty or corroded will not benefit from tightening and will require disassembly and cleaning to reestablish a good connection.

Because they can't always be seen by the naked eye, **one of the most effective methods of identifying faulty connections is thermal imaging.** Infrared equipment is used to capture thermal images that identify overheated connections when subjected to at least 40% of the maximum load. Thermal imaging should be performed periodically as part of a maintenance program, using baseline images to identify problem areas over time, and points of inspection should include all key electrical panels as well as any other high-load connections such as drives, disconnects, chillers, and air handlers, etc. Identified hot-spot connections should be disassembled, cleaned, repaired and reassembled.

MSC provides expert thermal imaging services as a diagnostic tool for mechanical and electrical HVAC-related issues.