HVAC/R • PROCESS COOLING • BUILDING AUTOMATION

TECHTALK

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Why NEBB Certification Matters for Complex HVAC & Process Cooling

When a facility's HVAC, process cooling, or building automation systems aren't performing to design, the problem often spans multiple disciplines. A cooling issue might involve interconnected mechanical equipment, control sequences, electrical components, and airflow balancing. Server rooms overheat despite proper equipment sizing. Process cooling fails intermittently. Lab environments can't maintain required conditions. These problems require systems-level analysis, not just component-level fixes.

The Challenge of Multi-System Problems

Many service providers focus on specific disciplines such as HVAC, controls, or electrical, which can lead to addressing symptoms rather than examining root causes when problems span multiple systems. Additionally, most TAB and commissioning work is performed by non-certified contractors, limiting diagnostic capabilities for complex system interactions.

MSC's NEBB-Validated Expertise

Mechanical Service Corporation has been solving complex, multi-system problems for decades as a premier service specialist. Our NEBB certifications in Air & Hydronic Balancing and Building System Commissioning validate and formalize the expertise developed through years of challenging projects:

- **Systems-Level Analysis**: Our experience with interconnected building systems is backed by NEBB's rigorous training in how HVAC, controls, electrical, and other disciplines interact.
- **Engineering Fundamentals**: The thermodynamics, fluid mechanics, and psychrometrics principles we apply daily are reinforced by NEBB's comprehensive testing standards.
- **Proven Methodology**: NEBB procedures complement our established systematic approach to troubleshooting complex performance issues.
- **Controls Integration**: Our Building System Commissioning certification formalizes years of experience with control strategies and BAS integration challenges.
- **Documentation Standards**: NEBB standards enhance our already-comprehensive diagnostic reporting, ensuring clients receive complete analysis and solutions.

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Our NEBB-Certified Services

MSC applies this expertise through our Testing, Adjusting, and Balancing (TAB) and Commissioning/ Retro-Commissioning services. Whether optimizing new system performance or diagnosing existing problems, our NEBB certifications ensure thorough, accurate analysis and lasting solutions.

NEBB-certified technician Jason Wright

When This Expertise Makes the Difference

NEBB certifications are particularly valuable to facilities dealing with:

- Critical process cooling with tight tolerances
- Complex VAV systems with BAS integration
- Cleanroom or laboratory environments
- Multi-zone facilities with interconnected systems
- Persistent issues requiring advanced diagnostics

The Bottom Line

Building system performance problems are often more complex than they first appear. MSC's NEBB certifications provide the analytical framework and systems expertise needed to solve challenging problems efficiently and permanently. Contact MSC to discuss your facility's performance challenges at 973-884-5000.

Senior Sales Engineer Mohamed Abdelrahman Brings Decades of Experience to MSC

After an extensive search to find someone ready to take the baton from a recently retired 40-year company veteran, MSC has found exactly what we were looking for in Mohamed Abdelrahman. Mo's arrival as Senior Sales Engineer brings over twenty years of HVAC industry experience spanning Carrier, Trane, Johnson Controls, and Armstrong Fluid Technology.

Finding someone who could step into this critical role without breaking stride was essential. Mo's background across major industry players gave him extensive exposure to sophisticated HVAC applications, equipment retrofits, and design/build projects. His proven track record with large-scale technical projects in healthcare, pharmaceuticals, advanced manufacturing, and other specialized environments aligns perfectly with MSC's focus, ensuring seamless continuity of our technical expertise.

"MSC has a reputation for solving the most challenging technical problems," Mo explains. "While I've worked on sophisticated projects throughout my career, I wanted to join a company where complex technical challenges are the primary focus rather than the exception."

Mo's arrival ensures that MSC's customers will continue to receive the same level of technical expertise and problem-solving capability they've come to expect. With his proven ability to manage complex projects and deep understanding of sophisticated HVAC systems, Mo is well-positioned to carry forward MSC's tradition of solving the industry's most challenging technical problems.

Commercial HVAC Expected Lifespans: A Facility Manager's Quick Reference

Rooftop Units — 15-20 Years

Watch for declining efficiency and increased repairs at ~15 years

Air Handling Units— 15-25 Years

Modular design allows component upgrades, potentially extending life

Split Systems — 10-15 Years

Outdoor condensing units are vulnerable to weather and corrosion

VAV Boxes — 20-25 Years

Controls may need updating before mechanical components

Make-Up Air Units – 15-20 Years

Similar to RTUs, but often face more demanding operating conditions

Heat Pumps — 10-15 Years

Year-round operation puts extra stress on heat pump systems

Electric Boilers — 20-30 Years

Water quality is critical – inadequate treatment causes premature failure

Gas-Fired Boilers — 15-25 Years

Combustion process creates more wear on heat exchangers and components

Air-Cooled Chillers — 15-20 Years

Shorter lifespan than water-cooled due to outdoor condenser exposure

Water-Cooled Chillers — 20-25 Years

Demands diligent maintenance and water treatment to achieve full lifespan

Cooling Towers — 20-25 Years

Susceptible to scale and corrosion without proper water treatment

Specialized Cooling — 15-25 Years

Server room and lab cooling equipment varies by application demands

Exhaust Fans – 15-25 Years

Lifespan influenced by environmental conditions and maintenance

Piping Systems — 25-50 Years

Some of the longest-lasting HVAC components when properly treated

CASE STUDY: MSC Solves Refrigerant Piping and Compressor Problems in 7-Story Corporate Building

MSC was called to investigate a malfunctioning HVAC system in a 7-story corporate headquarters building. The system consisted of a 100-ton roof-mounted condensing unit and an air handler located six floors below. Refrigerant piping design came into question when both scroll compressors failed due to high head pressure and high full load amperage (FLA) readings, causing the unit to trip on the overloads. System inoperability had forced the use of temporary cooling units to condition the space.

INVESTIGATION SCOPE

- Identify and trace the installed refrigerant piping
- Compare the existing installation to the provided piping diagram
- Provide recommendations for corrective actions
- Note any other relevant observations

KEY FINDINGS

Refrigerant Piping Configuration:

System lacks intentional traps, instead utilizing “running” traps due to elevation changes
Non-uniform pitch in liquid and suction lines
Numerous direction changes contributing to pressure drop
Potential for cross-connection in areas where pipes double back and cross over themselves

DX Coils:

- Two interlaced, dual-coils with independent TXVs
- Improper mounting angle of TXV sensing bulbs
- Absence of liquid line solenoids and sight glasses

Compressors:

- Both compressors, one variable speed and one standard, were non-operational
- Varying oil levels in compressors (one ¾ full, one ¼ full with dark oil)
- Unknown control parameters for the variable speed compressor

System Design:

- Absence of critical components like liquid line solenoids, sight glasses, and suction accumulators
- Unusual coil circuiting arrangement
- Lack of clear labeling on components

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Refrigerant Piping and Compressor Case Study (continued)

CONTRIBUTORS TO SYSTEM FAILURE

- Refrigerant migration during off-cycles
- Improper compressor control
- Possible line set cross-connection
- Uncertain refrigerant charge and oil management
- Lack of traps in piping where velocity is at the low end of the acceptable range for oil entrainment

10-STEP ACTION PLAN

Confirm compressor suitability and capability

Recover and weigh refrigerant to verify pipe circuiting between condensing unit and coils as well as the connection between equalization line and thermostatic elements for each TXV

Install liquid line solenoid valves and sight glasses for each circuit

Add suction accumulators to each circuit at the condensing unit for proper refrigerant return and to prevent liquid floodback

Install traps at the bottom of risers if feasible

Perform a triple evacuation of the system to remove all moisture, air, and non-condensible gases

Weigh in factory charge of the condensing unit with virgin refrigerant; weigh in 50% of calculated charge for refrigerant piping

Start up unit and charge with virgin refrigerant until proper sub-cooling reading is achieved

Verify compressor controls prior to operation and during startup; verify staging sequence between both compressors; verify programming of oil return or oil management cycle

Verify the controls of the air handling unit and the interlocking of the condensing unit

CONCLUSION

The failures in this high-capacity HVAC system were due to a combination of factors rather than a single issue. By addressing the refrigerant piping configuration, adding necessary components, and implementing proper control strategies, the system's reliability and efficiency could be significantly improved.