

OVERVIEW

Despite widespread adoption of oil analysis as critical maintenance practice for large HVAC systems, refrigerant testing remains a significantly underutilized diagnostic tool in campus and healthcare environments. While oil analysis provides vital insights into the compressor's mechanical health, it often fails to detect chemical or physical degradation within the refrigerant loop itself—a major contributor to inefficiency and premature component failure.

WHAT WE DID

We took 50 refrigerant samples across 11 diverse locations. Including: Major universities (e.g., University of Alabama, Ivy Tech College) Healthcare Institutions (e.g., Advocate Medical Center, Atlantic Health) Public sector and government campuses (e.g., Empire State Plaza). Each sample underwent laboratory analysis for key indicators of contamination and degradation, including moisture content, acid levels, oil carryover, non-condensables (e.g., air, nitrogen), and particulate matter. All testing was performed by an AHRI Certified Laboratory, ensuring the highest level of accuracy, reproducibility, and compliance with AHRI 700-compliant refrigerant testing protocols against recognized industry standards for refrigerant purity.

KEY FINDINGS

- **84%** of all chillers tested had contaminated refrigerant (classified as slight to critical).
- **48%** of systems exhibited serious or critical issues, requiring immediate attention or remediation.
- Many of the most compromised systems had no prior indication of performance issues reported by site operators or maintenance teams.

Category	Count	Percentage	Description
Clean	8	16%	Meets AHRI 700 standards; optimal performance expected.
Slight	14	28%	Minor deviations, potential for early efficiency loss or minor component stress. Proactive monitoring recommended.
Marginal	4	8%	Elevated contaminant levels; increased risk of efficiency reduction and accelerated wear. Remediation advised.
Serious	5	10%	Significant contamination; active degradation of performance and asset health. Remediation required soon.
Critical	19	38%	Immediate risk of significant energy loss, equipment damage, or failure. Remediation is urgent to prevent costly repairs or unscheduled downtime.



WHY REFRIGERANT TESTING

Without refrigerant analysis, systems rely solely on oil analysis—which often fails to detect issues within the refrigerant loop, especially contaminants that contribute directly to higher energy use and accelerated system wear.

PROJECTED LIFE IMPACT

Contaminated systems can experience up to a **30%** reduction in expected compressor life span due to accelerated wear and stress.

FINANCIAL IMPACT

- **10% efficiency loss due to contamination can equate to a \$30,000 - \$40,000 per year**

CONCLUSION

With **nearly half** of all chillers showing compromised refrigerant, this testing revealed not just hidden inefficiencies, but **untapped savings, risk reduction, and asset longevity opportunities**. For universities, hospitals, and research campuses—where uptime, budget, and sustainability matter—embracing routine, AHRI-certified refrigerant analysis, will help **safeguard their critical HVAC assets, ensure reliable operation, and achieve substantial energy savings**.

Additionally, it will demonstrate a commitment to environmental stewardship through reducing their emissions and ensuring adherence to increasingly stringent regulatory mandates. This approach **transforms a hidden liability into a strategic advantage**, optimizing asset performance, securing financial returns, and **promoting a sustainable future**.