



ECM
TECHNOLOGIES

HVAC Efficiency Specialists

**Energy conservation and
decarbonization have never
been so cool.**



OVERVIEW

What to know about HVAC/R Thermal Transfer Degradation

According to ASHRAE, oil-fouling of the heat transfer surfaces in air conditioning and refrigeration systems results in a 7% efficiency loss in the first year, followed by 5% in the second year, and 2% annually thereafter.
(1998 ASHRAE Handbook, Refrigeration, Chapter 2.9)

Here's why... As equipment ages, small amounts of the oil used to lubricate the compressor migrate into the system's heat exchanger coils. This oil-fouling forms a boundary layer that reduces heat transfer efficiency.

Oil-fouling also forces the equipment to work harder which leads to increased repair costs, lower capacity, and premature replacement. Additionally, when equipment runs longer, energy costs rise along with greenhouse gas emissions.

ASHRAE further states that, while mechanical solutions may reduce some problems, even high-tech designs are not efficient enough to remove all the unwanted oil in the heat exchanger coils.

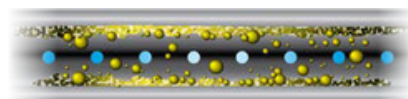
Summary

In conclusion, oil-fouling is virtually unavoidable and in a very short time, can significantly reduce equipment efficiency, increase energy consumption, decrease system capacity, and increase the likelihood of repairs and premature replacement due to accelerated wear and tear.

To restore efficiency loss resulting from oil-fouling, the oil boundary layer must be removed to increase thermal transfer performance. Until recently, no viable, cost-effective solution has been available to treat oil-fouling.

99%

of HVAC Systems experience efficiency loss due to thermal transfer degradation



A Closer Look at Oil-fouling

- Oil mixes with the refrigerant.
- The refrigerant and oil are circulated through the heat exchanger coils.
- Oil particles bond to the coil surface, forming growing deposits that impede heat transfer.
- The oil deposits increase drag, making the compressor work harder.
- The oil buildup eventually coats the inside surface of the coil, resulting in ongoing and worsening efficiency loss, along with reduced longevity.

Oil-fouling can reduce equipment efficiency by up to

30%

or more over the life of the system



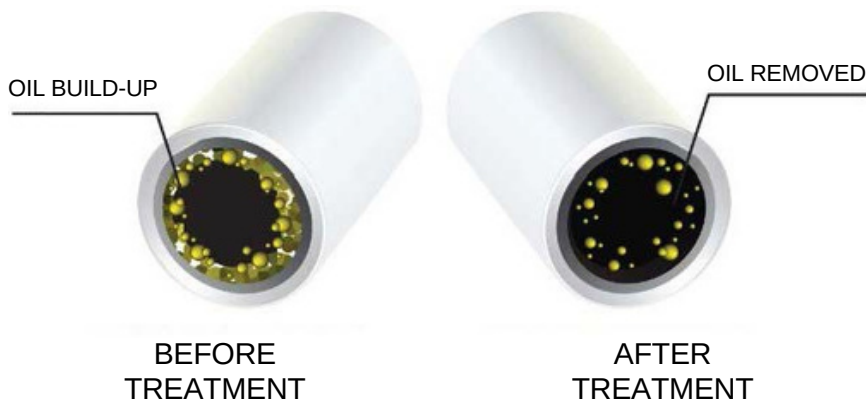


SOLUTION

One treatment provides a permanent solution

If oil build-up that forms in the HVAC/R equipment is like cholesterol in the arteries, then **ThermaClear®** is the cholesterol-clearing pill that helps everything run smoothly again.

However, instead of a daily pill, a single treatment of **ThermaClear®** lasts for the lifespan of your system.



ThermaClear®

- **Displaces the oil buildup from the metal surfaces of the heat exchangers to restore maximum heat transfer**
- **Super-lubricates the compressor(s) reducing unnecessary system stress**
- **Bonds to metal surfaces by establishing a permanent barrier that reduces compressor strain and prevents the formation of future oil deposits**

Reduce energy costs - Improve equipment efficiency
Improve system longevity – Reduce Emissions



Award Winning ThermaClear®

ThermaClear® is a proprietary, long-chain, nanomaterial that improves lubrication, removes internal oil-fouling, and prevents it from recurring.



One easy fix, so many upsides

- Helps save on electric bills
- Avoid premature repair and replacement costs
- Installs in one application with no downtime
- Restores HVAC/R system capacity and efficiency





BENEFITS

ThermaClear[®] by the numbers

Savings

- Averages a **12-36 month return on investment** after efficiency is restored
- Achieves, on average, **10% to 20% Annual HVAC/R** operational savings
- **One treatment** protects for the life of the equipment

Risk-free

- Requires no additional hardware and there is no equipment downtime for installation
- Thousands of installations with zero claims against any ThermaClear[®] treatment
- Every treated system is warranted for up to \$1,000,000 for the remaining useful life of that equipment. If a problem ever arises that is determined to be caused by our product, we will pay to have the equipment repaired or replaced

An industry leader

- Validated HVAC/R thermal degradation treatment solution with scientifically verified performance and savings results
- Recognized by accredited, independent third-party Professional Engineers and Organizations that have verified long-term product efficacy and sustainability
- The only performance-proven product to produce long-term energy cost savings by restoring efficiency in DX/Split and chiller units caused by thermal transfer degradation

Over

32,000

Individual units
treated to-date

From

1,600 Ton

water cooled chillers
down to

1/2 Ton

Mini splits

Up to

\$1 Million

Assurance warranty
protects equipment
for the useful life of
the HVAC/R
equipment

Qualified using the
following industry
organizations' standards:





Verification



ThermaClear® 100% Total Quality Assurance

ThermaClear® has been independently tested, validated and certified by **intertek** to be compatible with all refrigerants and refrigerant oils.

For more than 130 years, companies around the world have depended on Intertek to help ensure the quality and safety of their products, processes and systems.

Intertek is a leading Total Quality Assurance provider to industries worldwide. Consisting of more than 1,000 laboratories and offices and over 44,000 people in more than 100 countries, delivers innovative and bespoke Assurance, Testing, Inspection and Certification solutions for our customers' operations and supply chains.



Identify and mitigate intrinsic ThermaClear® raw material risk



Evaluating ThermaClear® quality, safety, sustainability & Performance standards



Validating the compatibility, specifications, performance & safety of ThermaClear®



Formally confirming that ThermaClear® meets or exceeds all trusted external & internal HVAC industry standards

NV5 recommends implementing ThermaClear® across the entire City Of Phoenix's HVAC equipment

NV5

September 8, 2020

Mr. Jim Gorombei
Energy Management Specialist
City of Phoenix Public Works
James.Gorombei@phoenix.gov

RE: Review of ECM Technologies ThermaClear™ Data and Calculations for the Phoenix Art Museum

Dear Jim,

We have reviewed the data that ECM Technologies collected and the calculations they did for the Phoenix Art Museum application of the ThermaClear™ to chiller 1, including the updated information provided by ECM as a result of the meeting between Public Works, NV5, and ECM on August 27th. We also did a higher-level review of data and calculations that ECM provided on three other applications of the product, at ASU and two projects in other parts of the country.


Based on the review of the above referenced information, we found that the data collection and subsequent calculations based on that data was thorough and based on sound engineering and M&V principles to estimate the benefit for the application of the product. We concur with the findings and believe that the installation of this product has a high potential to generate energy and cost savings for Public Works and other City facilities. We would recommend the use of this product as part of a larger ESCO approach to allow for the savings from this measure to help pay for more capital-intensive measures in a bundled offering.

We look forward to providing Public Works with additional assistance on its ESPC and other energy efficiency opportunities.

Best Regards,
NV5

Dave Wyllie
Dave Wyllie, PE, CEM, CMVP, LEED-AP
Senior Project Manager
NV5
Energy Efficiency Services

The City of Phoenix engaged outside Engineering Consulting firm NV5 to conduct an independent review of various pilot program performance gains and analyses to which they concurred and supported all aspects of the Measurement & Verification process and accompanying savings results.





SUCCESSES

Backed by data, loved by customers



The operation of the City's HVAC equipment on its roughly 12 million plus square feet of building space is the single largest use of electricity consumption. The meaningful efficiency improvement /cost savings that ThermaClear™ has demonstrated at the equipment level will contribute to the City's targeted sustainability goal of reducing greenhouse gas (GHG) emissions to 40 percent below 2005 levels by 2025. This equates to approximately \$1,000,000 in electricity cost and 8,484 metric tons of CO2 saved annually."

- Jim Gorombei

Energy Management Specialist, **City of Phoenix Public Works**



It is my pleasure to recommend the ECM Technologies electricity savings program to any company that desires to reduce electricity costs. ECM Technologies delivered on the agreed upon objective of achieving a minimum 8% annual reduction in HVAC electric energy use at our automotive dealership. Over the past 12 months, since the electricity savings program was implemented at Schumacher European, we have seen an 11.9% reduction in HVAC electricity use. I hope ECM Technologies is afforded the opportunity to provide any company that desires to save money on electricity costs the same results and level of service as was provided to Penske Automotive groups."

- Geoff Burns,

Project Manager, **Penske Automotive Group**



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- Dave Wyllie PE, CEM, CMVP, LEED AP

Sr. Project Manager, **Energy Efficiency Services, NV5**



The Numbers

Average energy reduction in kWh

JP Morgan Chase

12%

City of Phoenix

11%

Sky Harbor Airport

10%

Arizona State University

10%

GoDaddy

13%

Penske Automotive

12%



\$2.5 Million contract

Trusted on a Large Scale

In September 2022, the City of Phoenix increased its sole source contract to \$2.5 million for full-scale ThermaClear® treatment of the city's roughly 12 million square feet of conditioned space including Sky Harbor International Airport. As of November of 2023, fire, police, libraries, public work facilities, and airport properties have been treated with ThermaClear®



Let's work together to decarbonize the planet and save energy with ThermaClear®

ECM Technologies has begun its treatment roll-out of the ThermaClear® treatment solution. We're here at the ready to help you save money, restore your systems' efficiency, and help keep your HVAC equipment in peak condition for years to come.

Contact us to schedule your ThermaClear® treatment or request additional information

David Fenton

480.904.4348

dfenton@ecm-technologies.net

Mark Atherstone

530.321.6275

matherstone@ecm-technologies.net

Michael Daly, PE

602.920.5516

mdaly@ecm-technologies.net

John Gravatt, PE

480.751.7090

jgravatt@ecm-technologies.net

