DuPont™ ISCEON® MO99™

CASE HISTORY

ISCEON® MO99™ (R-438A) REFRIGERANT IS A PERFECT MATCH FOR PHOENIX HEAT

Retrofit of an R-22 roof-top heat pump in Phoenix, AZ to MO99™. Kirk Buscho and his team at North Valley Mechanical have converted over 50 units to MO99™ so far.

Background

Kirk Buscho, North Valley Mechanical, in Phoenix Arizona, has been researching R-22 alternatives over the last two years. Recent EPA activity made the search for a viable alternative more urgent. Kirk said, "We looked at a few products, several versions of R-22 replacements. We work closely with our local distributor, American Refrigeration Supplies, so we were informed on all of the options available today. For me, it was a matter of testing the products in the field so we could fully understand the best product in terms of performance similar to R-22. We wanted to make sure that the replacement refrigerant would hold up to the Phoenix heat."

When considering options to replace R-22, Kirk indicated there were several factors that were most important to him. He said, "I wanted a refrigerant that would perform. I wanted something that was easy and to be able to take out the old refrigerant and add in the new refrigerant without a lot of hassle. Mineral oil compatibility is huge for residential A/C systems. I wanted a refrigerant that was not going to be too picky about how you treat it and that lends itself to be compatible with mineral oil. I was looking for a design and performance parameters that mimic R-22 so my techs don't get nervous about using an alternative."

Residential Retrofit Project Details

In May 2012, Kirk decided to use ISCEON® MO99™ (R-438A) to retrofit a residential package heat pump (2.5 ton Goettl HP 305J, 12 SEER) that had a leaking indoor coil.

Kirk explained, "The system was down and several contractors had attempted to repair the unit, but were unsuccessful. The unit had been charged with R-22 during numerous attempts to fix the system and it appeared that the system would need to be replaced. The unit had a piston orifice going to the indoor coil, which looked like Swiss cheese; it was leaking everywhere. During the previous repair attempts, leak detection dye and system sealant had been added to the unit and the filter dryer was never replaced. Even with his home warranty, the customer was looking at an out-of-pocket expense of $2500 to $3000."

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As a last attempt to salvage the unit for the homeowner, Kirk devised a plan to retrofit to DuPont™ ISCEON® MO99™ refrigerant. He anticipated difficulty in locating parts for this unit. The old coil needed to be replaced but a new one was not available. A custom created coil could be ordered, but proved to be cost-prohibitive. Kirk identified another shape of coil that matched the old one in both size and tonnage. His field superintendent, Robert Forbes, configured and assembled the evaporator, including new air baffles on each side so that air would flow properly through the coil. Also, during the retrofit, the old piston orifice was changed to a thermal expansion valve (TXV).

With regard to the ISCEON® MO99™ conversion, Kirk stated, "On a package or split system, we've found you only need to replace valve cores and caps, as they have elastomeric seals. There's no need to replace Teflon® or nylon rings." After replacing the seals, he changed the filter dryer, evacuated the system to 500 microns, and charged the unit with ISCEON® MO99™ refrigerant, with a weight just under the original system specifications. After allowing the system to stabilize, he added approximately seven more ounces of refrigerant.

Results

The day of the retrofit was hot, with an outdoor temperature of 106° F. Kirk felt this was the ultimate test for ISCEON® MO99™. He explained, "The day of the retrofit was a good indicator, and subsequent days have been over 110° F as well with no problems with cooling performance. The final ISCEON® MO99™ charge was about 95% of the original system charge. In cooling we got a 21° temperature split (supply/return) across the coil with good air flow and the blower working to specification. We got good numbers for subcooling on the liquid line and superheat on the suction line. The pressures and temperatures matched stride-for-stride what we expected to see. We followed up with our customer on a couple occasions, basically going on a fishing expedition to see if there are any issues, and found our customer is extremely happy."

Conclusion

Kirk said, "The homeowner was very satisfied with the results of the retrofit. He told us, 'I'm thrilled because now I have cooling and my kids can sleep comfortably at night.' Having a happy customer is gratifying for us and it's what we strive for."

"We've converted approximately 50 units to ISCEON® MO99™ so far this year. We haven't had any problems or call backs on any of them."

Kirk added, "I know some people are concerned about ISCEON® MO99™, thinking about capacity loss. This is probably the largest hurdle to overcome, especially in Phoenix because of the heat. Many confuse the capacity of ISCEON® MO99™ with its energy efficiency. Compared to R-22, it takes a little longer to remove the same amount of heat, but needs less power to do so, so I see it as a net break-even. Since most home A/C equipment we run into is oversized, a little longer run time is a positive result for the homeowner because it gives a more even comfort level throughout the home."

For more information: isceon.com

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