Automotive Air Conditioning Analysis: Leak Detection 101

Since the carbon tax was introduced by the Gillard government at the beginning of this new financial year we have all seen the price of refrigerant gas increase by more than three fold. For weeks now we have been receiving phone calls from concerned workshops about the price of gas, with some suppliers charging as much as $68kg. In this issue of A/C Tech Tips we will be getting back to basics and discussing the 101 of leak detection methods as the common solution of “gas and die” for those hard to find leaks are now more costly than ever before. In this article I will discuss methods of leak detection that do not require the use of costly r134a.

Visual Inspection:

The first step in leak detection is always to check the system for dye! Starting with the service ports and the sight glass, identify if there is any UV dye using your UV light and glasses such as in the picture to the right. It is important to check the service ports before any charging stations are connected to the system as there could be die transfer from previous jobs. At this point if there is dye in the system, quoting a leak is straight forward, simply check for florescent stains on all components and hoses. If there are no visible stains in the engine bay compartment and the car has come in with no gas then you are safe to assume there is a leaking evaporator and quote the customer accordingly on removing and inspecting the component.

But what if there is no UV dye in the system?

As technicians we should not be so reliant on the use of UV die. As it is not a factory additive, in most cases you will be quoting without its aid. The refrigerant gas inside the A/C system has two purposes. The first is to provide the cooling properties required to transfer heat and the second task is to carry oil around the system to lubricate the components and seals. As such a refrigerant leak will also carry with it oil, oil that will cause a stain around any component in the system that is leaking. The easiest and most effective method of leak detection is simply to visually inspect all components of the system for oil stains around joins, O-ring seals and fittings. In 80% of all quotes performed in our workshop a leak is quickly detected simply by looking for an oil stain. The simplicity of this method should not be overlooked.

Ultrasonic leak detectors:

Ultrasonic leak detectors have been around for a long time but commonly criticised over their effectiveness of detecting small leaks. But now with the cost of gas so high there use might be reconsidered! The principal idea of the device is that it picks up the sound that is created by a gas or vacuum leak and as such by simply pulling the system into vacuum you are creating the conditions required for the tool to work and no expensive gas is required to test the system.

Nitrogen Testing

Another method currently being discussed in the industry is Nitrogen testing. With the cost of nitrogen at a fraction of the price of R134a many are looking at its use again. The idea is simply to place the system under pressure and use a liquid soap solution on the joins, when a bubbling effect occurs the leak has been found. It is a great idea however we recommend caution. For example exposing a control valve in a compressor to 200psi of nitrogen pressure will affect its operation and change its set point, causing more damage to the system and creating a costly repair.

Don’t overlook the simple solution to leak detection. Expensive equipment might look good and promise pain free operation but simply checking for the visual signs of leaks such as oil stains and grim build up around joins and components is the fastest and most effective method, and it’s free!

The Costly Cabin Filter Mishap!

Recently we received a Toyota Prado 120 series in our workshop with the owner explaining a bad smell from vents followed by poor airflow and the system not cooling. He also mentioned the car had been repaired less than a year ago after experiencing similar issues. Upon inspection we concluded that the compressor had seized due to the poor airflow through the evaporator core, causing it to freeze up and starve the compressor of its vital refrigerant and oil. Once we started Working on the car we quickly discovered the true cause of all these issues. The poor airflow problems the vehicle had encountered less than a year ago had been fixed by removing The cabin filter and replacing it with a piece of screen door mesh as you can see in the picture below.

The mesh will stop leaves and large objects but will not prevent dust, dirt and grime making its way through the ducts and down to the evaporator.

As you can see in the picture above, Dust and dirt trapped in the evaporator core is quickly turned to mud when combined with the condensation from the evaporator core. For the cost of around $25 the cabin filter can be replaced and save you the trouble of a costly comeback!

This Tec Article has been bought to you by CoolCompressors Pty Ltd and MrCool Automotive. Written by Ben Perry, technician and marketing manager. Please forward any questions to ben@mrcool.com.au.