

# Lubricating oil and dye in hybrid vehicles using electric A/C compressors

Based on feedback from our readers, the Cool Change newsletter will now include regular technical articles of interest to licence holders. Below is an article produced by ADAIR, and kindly provided to us by ARC member association – IAME.

## Lubricating oil and dye in hybrid vehicles using electric A/C compressors

**Refrigerant and lubricating oil are circulated together around the windings of the A/C compressor electric drive motor.**

**Lubricating oil** – Ensure that only the vehicle manufacturer's recommended 'non-conductive' oil is used in the A/C system. Do not use PAG (polyalkaline glycol) as it is highly hygroscopic (absorbs moisture) and even 1% of PAG oil in the electric compressor will reduce the compressor insulation resistance from 10 Megaohms to 1 Megaohm. Once the insulation resistance has been reduced the likely hood is that the compressor body will become 'live' and will cause electrocution to any person touching the compressor body. If PAG oil was mistakenly added to the A/C system, contact the vehicle manufacturer's representative for the corrective actions – which may involve flushing or replacing all A/C components. Some electric compressors have a voltage leakage sensor that will turn off the power supply to the compressor if a voltage is found at the compressor body. Hybrid A/C oils are non-conductive synthetic oils such as POA (Polyalphaolefin), POE (Polyolester) and Ester (Poly Ester).

The reason is that these synthetic oils are non-hygroscopic unlike the PAG oil. Consult the A/C compressor label for the correct oil type and quantity. POE is not suitable for using with HFO1234yf refrigerant.

When servicing Hybrid vehicle A/C systems use a dedicated charging station or equipment to avoid cross-contamination of oil. If using a non-dedicated station, ensure that the hoses and manifold are flushed to remove all residual PAG oil – the internal components and plumbing of the automatic machine must also be flushed.

**Leak Detection Fluorescent Dye** – It is the general consensus of all the hybrid vehicle manufacturers that leak detection dye should not be used in A/C systems using electric compressors. Some dyes contain PAG oil and even solvents. This will cause insulation resistance issues as mentioned earlier in the 'lubricating oil' section.

- Do not use dye containing PAG oil or flammable solvents
- Flush any servicing equipment that has contained PAG oil before using

The SAE (society of automotive engineers) is currently working on a standard for electric compressor leak detection dyes. The standard number once released is SAE J2297H.

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