

## Lubricating oil and dye in hybrid vehicles using electric air conditioning compressors

**Refrigerant and lubricating oil are circulated together around the windings of the A/air conditioning 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 megohms to 1 megohm. Once the insulation resistance has been reduced, it is likely that the compressor body will become ‘live’ and will cause electrocution to any person touching the compressor body.

If PAG 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 PAO (polyalphaolefin) POE (polyolester) and Ester (Poly Ester). The reason is that these synthetic oils are non-hygroscopic, unlike PAG oil. Consult the A/C compressor label for the correct oil type and quantity. POE is not suitable for use 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 vehicles 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 in the ‘lubricating oil’ section above.

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