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Ultraviolet Leak Detection: Procedure for Use of Refrigerant Leak Detection Dyes for Service of Mobile Air-Conditioning Systems

RATIONALE

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**Foreword**—The purpose of this document is to establish safety precautions and a guideline procedure for the application of fluorescent dyes and ultraviolet leak detection within mobile air-conditioning systems.

**1. Scope**—This SAE Standard applies to the application of ultraviolet leak detection to service mobile air-conditioning systems.

## **2. References**

**2.1 Applicable Documents**—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1628—Technician Procedure for Using Electronic Refrigerant Leak Detectors for Service of Mobile Air-Conditioning Systems

SAE J2297—Ultraviolet Leak Detection: Stability and Compatibility Criteria of Fluorescent Refrigerant Leak Detection Dyes for Mobile R-134a Air-Conditioning Systems

SAE J2299—Ultraviolet Leak Detection: Performance Requirements for Aftermarket Fluorescent Refrigerant Leak Detection Dye Injection Equipment for Service of Mobile Air-Conditioning Systems

## **3. Statements, Cautions, and Warnings**

**3.1** A supplier of fluorescent leak detection dyes meeting the specifications in SAE J2297 shall provide a set of instructions which must include the following cautions and warnings verbatim.

3.1.1 CAUTION—Since the use of an ultraviolet leak detection dye requires the addition of a chemical substance into the A/C system which may or may not be compatible with the system, such dyes should not be used unless they are either expressly endorsed by the A/C system and/or vehicle manufacturer or meet the requirements of SAE J2297.

3.1.2 WARNING—Ultraviolet light is hazardous if eyes and skin are exposed over time. Ultraviolet light exposure should be minimized by wearing UV-blocking eyewear and always directing the light source away from one's body and protecting the bare skin.

**3.2** A supplier of fluorescent leak detection dyes meeting the specifications in SAE J2297 shall provide plainly legible and durable underhood labels which shall be mounted in the engine compartment, such as on a body structure part or air-conditioning component, not normally replaced during service or vehicle accident damage replacement, where it can be easily seen. The labels shall indicate the fact that a fluorescent dye had been installed into the A/C system, and the manufacturer of the dye. The labels shall also state: "Caution - System to be Serviced by Qualified Personnel." Sufficient labels shall be provided to accommodate the maximum number of vehicles which the container holding the dye may be able to treat.

#### **4. Procedure for Use**

- 4.1** To assure safe and effective use of the ultraviolet leak detection method, use ultraviolet lamps and aftermarket fluorescent refrigerant leak detection dye injection devices which meet SAE J2299. UV-blocking protective eyewear should always be employed when performing ultraviolet leak detection.
- 4.2** Check in the engine compartment for an identification sticker indicating that a fluorescent leak detection dye has been previously added into the A/C system.
- 4.3** Remove the low-side service port sealing cap and direct the ultraviolet lamp into the valve stem area. Depressing the valve stem for an instant may be required to help bring some of the lubricant and dye out of the system. Observe these oil traces for fluorescence.
- 4.4** If fluorescence is observed in the low-side service port, assume that a fluorescent dye is within the system and proceed to search for leaks. If fluorescent material does exit the service port, note its location so that it does not provide false leak indications.
- 4.5** If no fluorescent dye has been previously installed into the A/C system, add the dye per the manufacturer's instructions.
- 4.6** Place the identification label supplied with the dye in a prominent place within the engine compartment, preferably near the A/C charge label if possible.
- 4.7** Verify that the A/C system has sufficient refrigerant per factory specifications. A minimum of 15 min of compressor operation is required to circulate the dye.
- 4.8** Inspect the system with an ultraviolet lamp as per 4.9 to 4.13. Only larger leaks may be visible at this time since only a small amount of time has been allowed for the fluorescent dye-oil mixture to accumulate around leak sites. If a leak cannot be found, the customer may need to return in a week or more, after having operated the A/C system as much as possible, so that sufficient fluorescent dye-oil mixture has had time to collect at the leak site, making it visible under ultraviolet illumination. Bring the system's refrigerant charge up to the factory specification before returning the vehicle to the customer.
- 4.9** Inspect the entire A/C system with the ultraviolet lamp when the engine is not operating. Perform the leak inspection under low ambient light conditions to increase the apparent brightness of the fluorescing leak sites.
- 4.10** Trace the entire refrigerant system, paying special attention to signs of damage or corrosion on all fittings, hose-to-line couplings, refrigerant controls, service ports, brazed or welded areas, and areas around all attachment points. Check for evaporator leaks by illuminating the condensate drain hole with the ultraviolet lamp.
- 4.11** Trace the refrigerant system following a continuous path so that no areas or potential leak sites are missed. If a leak is found, continue to check the remainder of the system as other leaks may be present.