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SURFACE VEHICLE RECOMMENDED PRACTICE

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(R) Air-to-Air Charge Air Cooler (CAC) Internal Cleanliness

RATIONALE

This document has been updated to correct spelling and grammatical errors. The scope was revised to be all inclusive and read properly. The procedure, Section 4.2, was reconfigured to improve consistency. The document was correctly balloted as a Recommended Practice.

1. SCOPE

This SAE Recommended Practice outlines a procedure and acceptance criteria for determining the internal cleanliness of CAC assemblies ready for installation in the engine air intake loop in vehicle or stationary applications.

2. REFERENCES

2.1 Related Publication

The following publication is provided for information purposes only and is not a required part of this document.

2.1.1 SAE Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1148 Engine Charge Air Cooler (CAC) Nomenclature

3. ACCEPTANCE CRITERIA[1]

Completed CAC assemblies shall meet the following internal cleanliness criteria:

a. Maximum Weight of Debris = 25.0 mg (8.82×10^{-4} oz)

b. Maximum Debris Particle Size = 3.175 mm (0.125 in)

c. Maximum Debris Particle Area = 2.58 mm^2 (0.004 in^2)

Particles for dimensional analysis include sand, scale, cleaning shot, machining chips, weld spatter, slag, or particles not easily broken with a probe.

[1] Confirm applicability of this criterion with your specific engine manufacturer.

4. TEST METHOD

The apparatus and procedure for determining CAC internal cleanliness is described as follows:

4.1 Apparatus

5.0 μ Qualitative Grade Filter Paper
0.5 μ Membrane Filter Paper
Filtering Assembly
Vacuum Filtering Flask
Beakers
Reagent Grade Solvent, i.e.: Methanol[2]
Analytical Balance Sensitive to 0.1 mg
Drying Oven
Desiccator
Tweezers
Magnification Device with Scale

4.2 Procedure

a. All glassware and the test area used for determining CAC compliance with this document must be clean and free from debris.

b. Filter the selected test solvent through a 0.5 μ membrane filter paper.

c. Place a 5.0 μ qualitative grade filter paper in the drying oven at 100 °C (212 °F) for 15 min. Remove filter paper from drying oven and place in a desiccator to cool to 20 °C (68 °F). Remove filter paper from the desiccator and weigh it to the nearest 0.1 mg (3.5 x 10^{-6} oz) with an analytical balance. Record tare weight of filter paper as Wt0.

d. Position the CAC so that the inlet and outlet portals are facing upwards. Pour a volume of filtered solvent equal to 40% of the total internal volume of the CAC into the CAC air inlet portal, and cap the air inlet and outlet portals.

e. Tip the CAC back and forth in such a manner that the inlet and outlet tanks are alternately filled with solvent. Repeat the back and forth tipping for 10 cycles to ensure that the solvent flushes all the internal surfaces. Tipping the CAC back and forth so that the solvent flows from one tank to the other and then back to the first tank is equal to 1 cycle.

f. Drain half of the solvent from the air outlet portal of the CAC into a beaker. Drain the other half of the solvent from the air inlet portal of the CAC into a beaker. Filter the solvent through the previously prepared and weighed 5.0 μ filter paper, which has been set up in the vacuum filtering assembly.

g. The spent filtrate can be used for future CAC testing after it has been filtered through a 0.5 μ filter paper.

h. Remove the filter paper from the filtering assembly and place it in the drying oven at 100 °C (212 °F) for 15 min. Remove the filter paper from the drying oven and place it in a desiccator to cool to 20 °C (68 °F). Remove the filter paper from the desiccator and weigh it to the nearest 0.1 mg (3.5 x 10^{-6} oz) with an analytical balance as Wte.

i. The dry weight of the filter paper with the debris residue (Wte) minus the tare weight of the filter paper (Wt0) equals the debris weight (Wtd). Compare the measured debris weight (Wtd) to the debris weight limit to determine if this requirement has been met.

[2] This is highly volatile and flammable solvent and should be handled accordingly. Methanol is compatible with most metallic and non-metallic CAC component parts. If possible, CAC component part compatibility with methanol should be confirmed prior to testing.