

Emission Tests of Clone Toner Cartridges

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Executive Summary

This study determined the emission rates of an HP Blue Angel certified printing system when using clone cartridges. The emission tests were carried out according to Blue Angel protocol RAL-UZ 205. The printer was tested with four different brand clone cartridges.

When the printer operated with the four brand clone cartridges:

- Emissions including TVOCs, styrene or particles were higher than Blue Angel limit.
- The printing system fails Blue Angel emission requirements.
- The printing system is not guaranteed to meet the Blue Angel criteria with a clone cartridge.

1 Introduction

Indoor air quality (IAQ) is important to human health. To reduce emissions and improve IAQ, the German government has set emission criteria for office equipment with printing function, RAL-UZ 205. Devices with low emissions which fulfill the emission criteria are certified with the Blue Angel label. Leading printer manufactures have their products tested before market introduction. Blue Angel emissions tests are based on a manufacture's printing system, which includes both the OEM printer and OEM cartridge. However, there are several clone cartridges available on the market, which are intended to be compatible replacements, but are not produced by an OEM. If a printer using clone cartridges has not been tested for emissions, the printer's ability to fulfill the Blue Angel emission requirements is unknown.

This report summarized the results of a study, commissioned by HP Inc, where the emission rates of substances from the laser printer HP LASERJET Pro MFP M425dn equipped with four different clone toner cartridges were determined at Fraunhofer Wilhelm-Klauditz-Institute (WKI). Based on the standard DIN EN ISO/IEC 17025 the department of WKI for Material Analysis and Indoor Chemistry (MAIC) is an accredited test lab for emission measurements of printers. WKI, located in Braunschweig, Germany, was founded in 1946 by Dr. Wilhelm Klauditz, and joined in 1972 the Fraunhofer Association which is Europe's largest application-oriented research organization. The products and materials WKI examines range from classic wood-based materials through plastics and building products to products from the automotive, electronics, aviation, food and printer industries.

2 Methods

In this study, 4 clone cartridge brands were tested with the HP LASERJET Pro MFP M425dn (Clone A, B, C and D). For these tests, the printer speed was 33 pages per minute (ppm) in simplex, monochrome mode. Emission rates of Volatile Organic Compounds (VOCs), ozone, dust, and fine and ultrafine particles were measured and calculated according to the Blue Angel test protocol RAL-UZ 205.

3 Results

All of the clone cartridges tested failed Blue Angel emission standards. Figure 1 shows the percent of the Blue Angel limit values of the tested clone cartridges. All four clone cartridge emissions exceeded the limit of TVOCs (total Volatile Organic Compounds); Clone A and Clone B emissions exceeded styrene limit; and Clone A and Clone C emissions exceeded the particle limit.

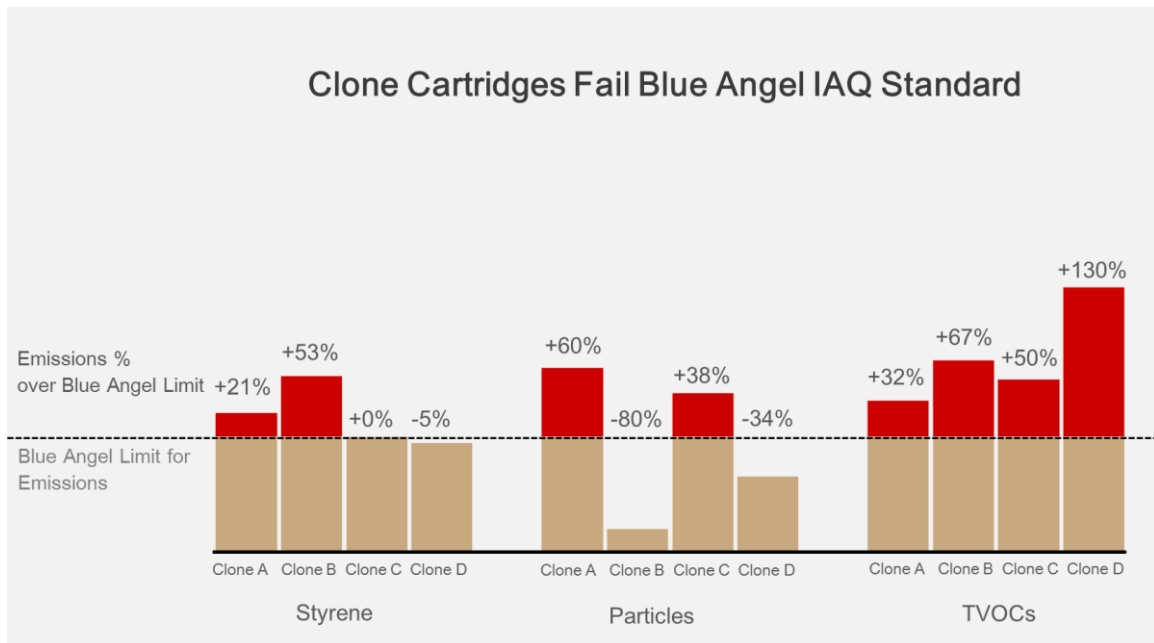


Figure 1. Clone cartridges exceed Blue Angel substance emission limits.

1. Emission limit for styrene is 1.0 mg/h in monochrome mode
2. Emission limit for particles is 3.5×10^{10} particle/10-min printing
3. Emission limit for TVOCs is 10 mg/h in monochrome mode

4 Summary

The test results provide the following implications for the manufacturers and users.

Blue Angel emission tests for a printer certification are carried out on the printers operated with OEM toner cartridges. When printers are operated with clone cartridges, emissions could change. For printers that obtained a Blue Angel label with OEM toner cartridges, printing with clone cartridges does not guarantee the Blue Angel standards will continue to be met.

The printer operated with four different clone cartridges in this study emitted higher levels of TVOCs and in some cases higher styrene and particles than Blue Angel limits. The use of these clone cartridges on HP printer failed the Blue Angel emission requirement.

The use of clone cartridges for printing could impair the indoor air quality, and it is not guaranteed that the combination of a printer with Blue Angel label and clone cartridge can meet the Blue Angel criteria.

Definitions

VOCs (Volatile Organic Compounds)

General: organic compounds that are emitted from the test object and are detected in the chamber air. For the purposes of this test method: identified and unidentified organic compounds which elute from gas chromatographic separation on a nonpolar column between n-hexane and n-hexadecane, including these compounds. Styrene is one of the volatile organic compounds with a chemical formula of C_8H_8 .

TVOCs (Total Volatile Organic Compounds)

Total content of volatile organic compounds, i.e. the sum of the concentrations of identified and unidentified volatile organic compounds which elute from gas chromatographic separation on a nonpolar column between n-hexane and n-hexadecane.

Particles

Small bodies suspended in air or gas having specified physical boundaries and consisting of liquid and/or solid substances. The number of particles emitted was determined within the size range of 5.6-560 nanometer.

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