



# INDOOR AIR QUALITY PERFORMANCE OF TONER CARTRIDGES





# Indoor Air Quality Performance of Toner Cartridges

Image reproduction equipment such as laser printers and multi-function devices are widely used in business, commercial, industrial, and public sector environments around the world. Before market introduction, devices of leading original equipment manufacturers (OEMs) are often thoroughly checked for their performance for indoor air quality (IAQ) aspects.

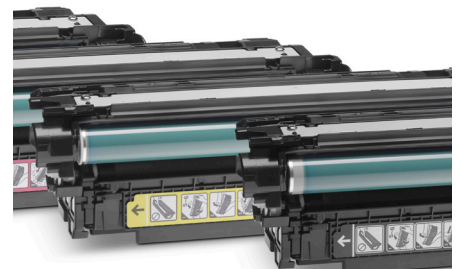
Accordingly, OEMs design and test their printer systems for compliance with applicable guidelines, as defined by the widely recognized UL ECOLOGO®, EPEAT, and the Blue Angel (“der Blaue Engel”) eco-label programs. Such certification requires testing of OEM printers together with OEM toner cartridges.

Several non-OEM cartridges are also available on the market including remanufactured cartridges which may use parts from OEM cartridges and “clones/new build compatibles” which are new non-OEM cartridges. These non-OEM cartridges are intended for use with popular printing systems but they are filled with non-OEM toner. Therefore, if depleted OEM cartridges are replaced by these non-OEM cartridge alternatives, it may no longer be ensured that the printing systems’ performance lives up to the strict certification guidelines. In fact, testing performed by a team of UL scientists, researchers, and engineers demonstrates that the devices’ IAQ performance can be substantially altered by the use of non-OEM toner cartridges. While some of the global eco-label standards are applicable to remanufactured cartridges, there are no existing environmental standards for “clones/new build compatibles”.

## Why indoor air quality matters?

In today’s industrial societies, people spend an estimated 90 percent of their time indoors. Accordingly, there is a notable interest in the IAQ performance of devices designed for use in offices and other commercial indoor environments.

As is the case for other technical equipment, environmental features of printers can be characterized by the use of eco-label programs and certification requirements. Testing according to such programs, and comparison against guidelines of such programs, yields good insights into the IAQ performance of the devices.





### What did UL do?

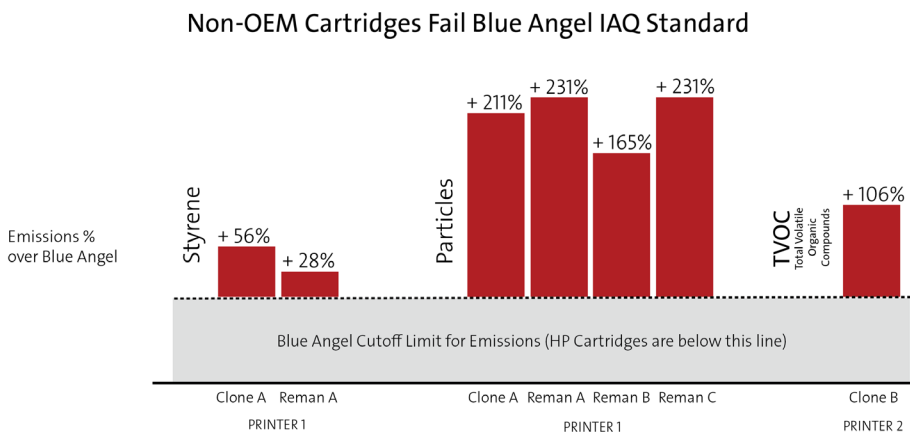
UL Environment conducted testing to evaluate the emissions profile of two high-end HP color laser printer models used with both OEM and non-OEM toner cartridges including remanufactured and clones/new build compatibles. These printer models were designed for heavy duty use in an office. Measurements were performed in accordance with the methods described in Appendix S-M of the RAL-UZ 171 Blue Angel award criteria, including a total of eight different emissions evaluations involving the two printer models and eight different toner cartridges. All HP laser printer models selected for testing had previously been evaluated for compliance with Blue Angel requirements using OEM toner cartridges, and were awarded certification.

Results revealed frequent, and at times substantial, differences in the emissions profiles of printers using OEM toner cartridges and the same printers using non-OEM cartridges. Altered performance parameters, when testing with non-OEM toners, occurred in all categories tested, ranging from different chemical substance emissions to variations in the particle release behavior of the devices. A summary of the non-OEM cartridge tests results that exceeded the Blue Angel substance emission limits is shown in Figure 1.



HP LaserJet Enterprise 700

Figure 1. Non-OEM Cartridges Fail Blue Angel Substance Emission Limits



1. Emission limit for Styrene is 1.8 mg/hr in color mode
2. Emission limit for Ultrafine Particles is  $3.5 \times 10^{11}$  particle/10-min printing
3. Emission limit for Total VOC is 18 mg/hr in color mode

In summary, this leads to the conclusion that end-users cannot ensure that their IAQ performance requirements are met when their printers are not operated with OEM toner cartridges. The same holds true for meeting the criteria of relevant certification programs such as the UL ECOLOGO® and the Blue Angel for original printing systems.



### Implications of UL's research findings

Overall, UL's testing of selected HP laser printers demonstrates that, in many cases, the use of non-OEM toner cartridge alternatives may substantially impair the printing behavior of printers that have been previously certified for their favorable IAQ performance.

Taking into account that UL's testing was limited in scope and scale, there are, however, several potential implications from the testing results, as well as a number of recommendations for manufacturers, buyers and consumers:

First, users should know that OEMs can only ensure a consistently high level of IAQ performance of their printers when operated with OEM toner cartridges. If the printing system is operated with a non-OEM cartridge, this might not be ensured anymore.

Secondly, users should be aware that testing and certification requirements for OEM printing systems are most comprehensive and closest to real-life operating conditions as they include evaluation of the whole printing system (printer, cartridges and paper) under worst case operating conditions. Should non-OEM cartridges be used, the performance attested by Blue Angel certification of the OEM system might be substantially altered.

Third, manufacturers of both printers and printer products should provide clear, unambiguous information and documentation regarding environmental certification for their products.

And finally, company procurement and purchasing specialists should seek complete and detailed information regarding the printers and printer products they purchase, such as IAQ data sheets and other safety documentation. Especially for printing systems, it is good due diligence to verify that environmental certifications for original printing systems, operated with OEM toner cartridges, have been obtained.