



I.S.P.E.S.L.
CENTRO RICERCHE LAMEZIA TERME

Centro Ricerche di Lamezia Terme
Zona Industriale ex SIR 88040 - Lamezia Terme - CZ
tel. 0968 - 209822 - Fax 0968/209580

30 LUG. 2008

N° PROT. 873

Requested by ECO SERVICE OFFICE Srl

Lamezia Terme 28th January 2008

Our Ref. CRLT:114

Upon request of Eco Service Office Srl (Prot. No. 114 of 28th January 2008) tests were carried out at the ISPEL Research Centre of Lamezia Terme on 16th April 2008 in order to measure Volatile Organic Compounds and Formaldehyde emissions from laser printers (Black end Colour) using equipment supplied by the above mentioned Company, as specified in their request.

Subsequently tests were carried out in order to determine ozone concentration in emissions from a laser printer used in the Lamezia Terme research Centre offices.

The primary scope of these exams was to determine levels of Volatile Organic Compounds, Formaldehyde and ozone produced by a laser printer, both with and without the use of a filtering system manufactured by Eco Service Office Srl.

EVALUATION OF VOLATILE ORGANIC COMPOUNDS

Samples were taken in the presence of Mr Simoncelli, Director of Eco Service Office Srl, with the printer in operation at standard capacity (printing 540 copies), both with and without the Eco Service filtering device, in order to determine, in both cases, concentration levels of VOC dispersion in the air. HYDROCARBONS 36-126° BP procedure was adopted in determining VOC levels. SKC active samplers were used implemented by active carbon vials collectors (70mm long and 6mm OD) with 100/50mg main/secondary section. The validity and efficacy of the sampling was confirmed in verifying this absence of the compounds under study in the secondary section that serves as an inspection tool.

Samples of VOC were carried out by means of a special carton air duct purposely fitted to convey the air flow coming from the printer (Fig. 1)

- **Sample 1:** The Eco Service filtering device was replaced with the carton duct and samples were taken at its exit with the printer in operation.
- **Sample 2:** The Eco Service filtering device was reinserted and the carton duct positioned on its end where samples were taken with the printer in operation.

The results are shown in the table here below:

Sample Number	VOC mg/cu.m.
C1	23.16
C2	udl*

* Under Detection limit: (10 ppb benzene)

EVALUATION OF FORMALDEHYDE

The NIOSH 2016 procedure has been adopted in determining formaldehyde levels, with samples taken silicon gel vials coated with 2.4 - dinitrophenylhydrazine (Supelco starter kit LP DNPHS 10) and subsequently tested with HPLC-UV. Samples were taken with active SKC samplers at a 1.5 L/min flow.

In the presence of Mr Simoncelli, director of Eco Service Office Srl, using a laser printer supplied by the above mentioned Company as specified in their request, two kinds of sampling were carried out, shown here below together with the test readings, with and without the use of

Eco Service device. Initially the Eco Service device filtering pads were removed from the appliance and replaced with a parallelepipedon shaped carton air positioned on the opening left by the removal of the filtering device (Fig. 1)

The first Sample (No. 1) was collected during the printing of 540 pages, while placing the absorption vial on the upper end of the carton duct without the filtering device. Concentration levels observed are shown on table 1:

Sample Number	Mg/cu.m. Formaldehyde
1	0.0116

TABLE 1

Subsequently the filtering device pads were replaced and samples taken during the printing of 540 pages; the absorption vial was placed on the upper end of the carton duct with the filtering device. Concentration levels observed on sample No. 2 are shown on table 2:

Sample Number	Mg/cu.m. Formaldehyde
2	0.00063

TABLE 2

EVALUATION OF OZONE

As requested, ozone levels evaluation was carried out on a laser printer used in Lamezia Terme' s CR ISPESL Offices, and fitted with an Eco Service filtering device.

Ozone levels were recorded by means of an Environment S.A. 42M direct reading ozone analyser whose monitoring principle is based on UV light absorption at 254nm due to O₃ molecule electronic resonance. The Environment S.A. 42M analyser supplies indirect ozone data every two minutes.

Ozone level measurements taken the printer in operation, were conducted in the same manner as described in conducting VOC and formaldehyde tests; that is by means of a special carton air duct fitted with the purpose of conveying air flow coming from the printer (Fig. 1) Ozone levels were sampled both with and without the Eco Service filtering device.

Diagram 1 shows test readings as well as blank readings of ozone levels, with no printing in operation, recorded before and repeated after every single measurement

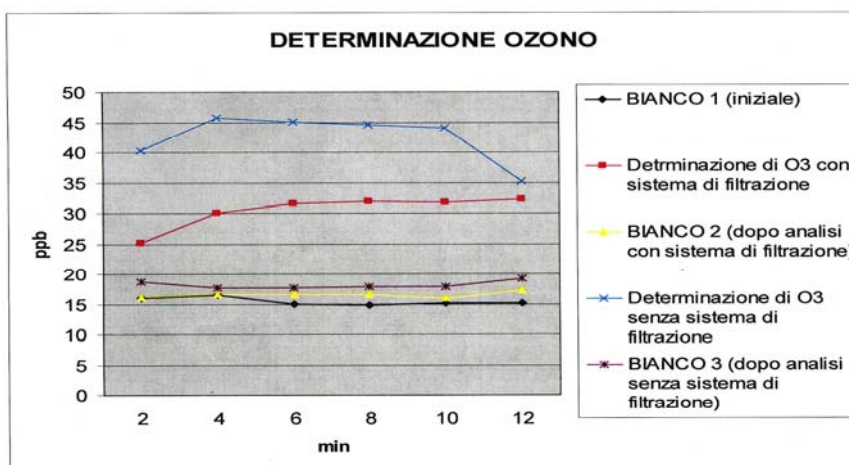
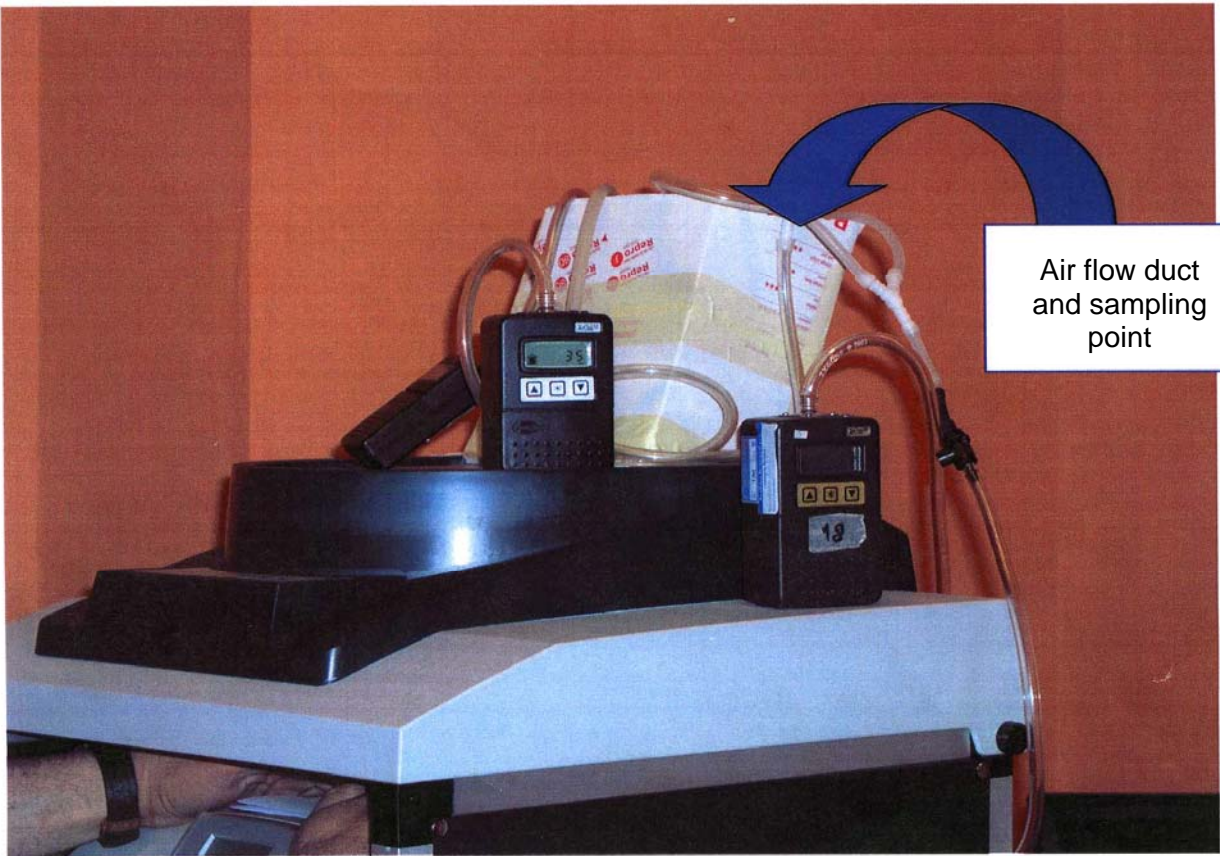


DIAGRAM 1



Ricercatori

dott.sa Elena Barrese

dott.sa Marialuisa Scarpelli

dott.sa Donatella Turbante

I Tecnici

Per. chim. Ivano Ammoscato

Per. Ind. Roberto Trovato

dott.sa Daniela Sorrentino

Visto
Il Commissario Straordinario
prof. Antonio Moccaldi