YORK INTERNATIONAL
(NORTHERN AISA) LTD.

REPORT ON

EVALUATION OF THE PEROFRMANCE OF A FAN COIL UNIT EQUIPPED WITH NANO TECHNOLOGY COATED TITANIUM DIOXIDE DEVICE

(Project No. : 4101-40014285)

Environmental Management Division
Hong Kong Productivity Council

24 May 2005

1. Name and address of Client Company

York International (Northern Asia) Ltd.

15/F, Tower II, World Trade Square,
123 Hoi Bun Road,
Kwun Tong, Kowloon

2. Objective

The study was to evaluate the efficiency of the removal of total volatile organic compounds (TVOC) in air of a fan coil unit equipped with a unit of titanium dioxide (TiO_2) device.

3. Details of the Equipment Under Testing

A unit of fan coil unit and titanium dioxide device were provided by the client. The detailed information of the tested equipment is listed below:

Fan coil unit : YORK model YGFC-06-CC-3-H with TiO_2 device with maximum air flow rate is 710 cubic foot per minute

4. Methodology of the Study

4.1 Setup of the Testing System

The performance study was carried out inside a typical meeting room with dimensions 3.85 m (W) x 4.8 m (L) x 2.4 m (H). Normally the meeting room was served with air-conditioning and fresh air supply, but the ventilation and air-conditioning were suspended during the evaluation. The fan coil unit and the titanium dioxide device were set up while the air recirculation was achieved by the operation of the fan coil unit. During the measurement, the fan coil unit was maintained running "Low-speed". The setup of the testing system is as below:

Figure 1 The meeting room deployed for the efficiency test

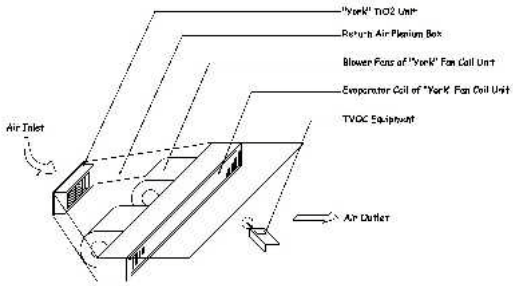


Figure 2 Schematic drawing of the experimental set up

Figure 3 Photo of the TiO2 device

Figure 4 Photo of the TVOC analyzer

4.2 Test Parameters and Methodology

The study was carried out on 28 April 2005. In order to simulate the levels of TVOC in typical indoor environment, a known amount of toluene was added to the chamber air to achieve higher TVOC level in typical indoor environment. One unit of TVOC analyzer were placed at the outlet stream of the fan coil unit to monitor the variation of TVOC level during the test. The TVOC analyzers measured and recorded measurement results every 5 minutes

The testing method is summarized in Table 4.1

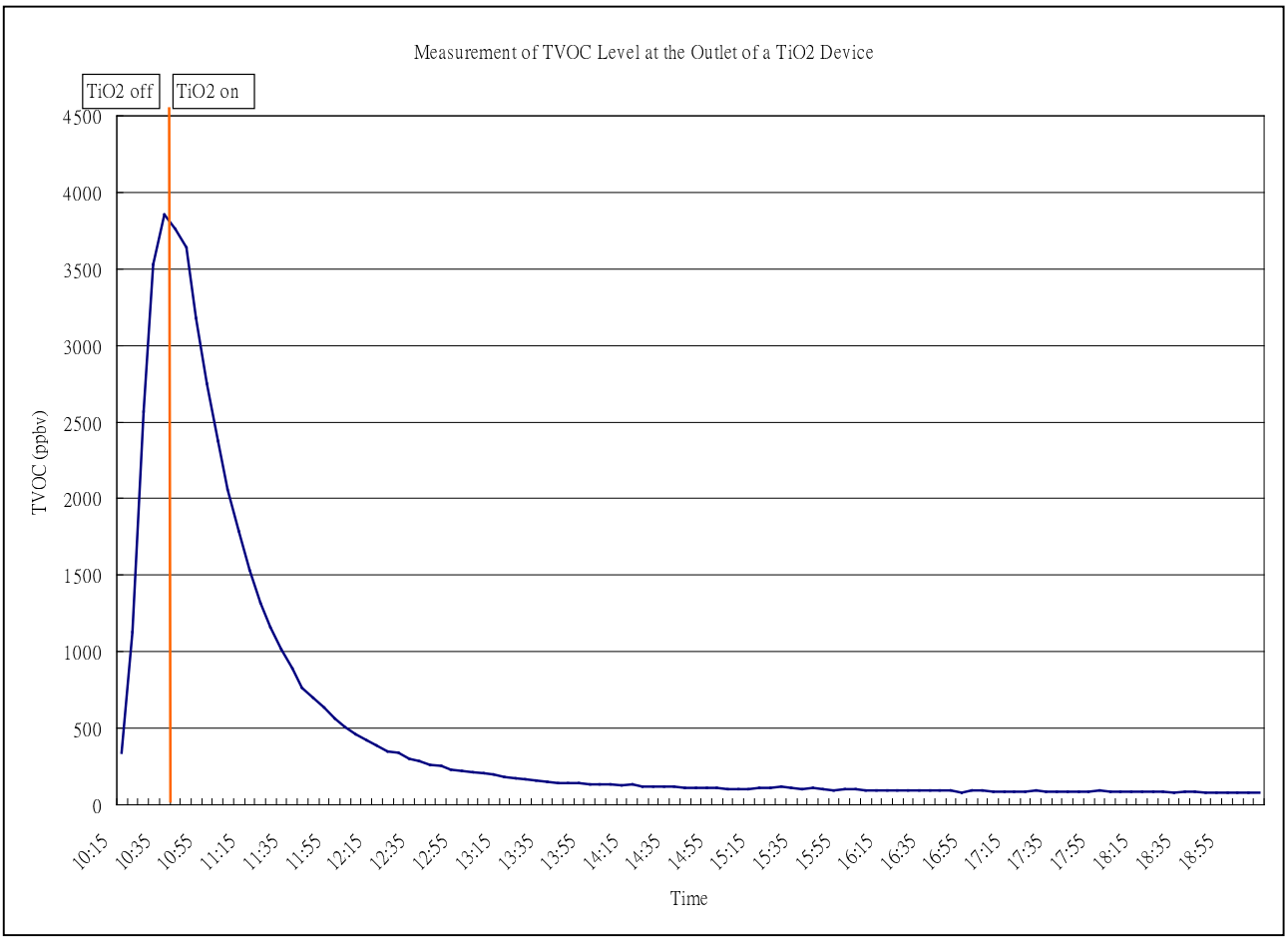
Table 4.1 Test Parameter and Methodology

Test Parameter	Test Methodology
Total volatile organic compounds (TVOC)	Continuous monitoring of TVOC with a photo-ionization TVOC monitor. 5-minute average of TVOC levels were recorded

5. Results of Study

The levels of TVOC at the outlet stream of the fan coil unit are shown in Figure 1.

Figure 1 Variation of TVOC Levels During the Evaluation of a Fan Coil Unit and Titanium Dioxide Device



According to Figure 1, the TVOC level rose up in a short period of time upon injection of toluene. The TiO_2 air purifier was switched on when the TVOC level was the highest. It was noted that the TVOC level at outlet stream decreased obviously after switching on the air purifier. Finally the TVOC level resumed to background level after about three hours.

Based on the measurement result, the TVOC removal efficiency of the TiO_2 air purifier is evaluated as follows:

Highest TVOC level attained before switching on the TiO_2 air purifier	3854 ppbv
Average background TVOC level after the operation of the air purifier	92 ppbv
Removal Efficiency (%)	$1 - \frac{\text{(Background TVOC level)}}{\text{(highest TVOC level)}} = 97.6\%$

It is noted that TVOC removal efficiency of the TiO_2 air purifier was about 97% after three hours operation.

6. Limitation of Measurement

The results obtained in this test are only representative of the pollutant concentration at the specific sampling time, location and under designated conditions. The result should not be extrapolated to other conditions without caution.

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