

JOL MACAU

- Project : PAHs (Benzo(a)pyrene, Benz[a]anthracene, Dibenz[a,h]anthracene) measurement for Starworld Hotel, Macau

Indoor Air Quality Measurement Report
Our Reference No.: L12-2379/001

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A. SCOPE OF THE REPORT

This report is indicating the findings of the site measurement and laboratory work for the Indoor Air Quality (IAQ) measurement at Starworld Hotel which is performed by LAWN Environmental Protection Ltd.

To gain the profile on indoor air quality condition, PAHs measurement (before test), one sample is made at Room 2630 which is the measurement at no installation of air purification system and no smoking and the other PAHs measurements (after test) are made at the followings three rooms under the below condition :

- Room 2535 (installed Plasma air purification system and PAHs measurements were made 0 minute, 30 minutes and 60 minutes after smoking of 8 cigarettes. (3 samples)
- Room 2536 (installed Biozone air purification system and PAHs measurements were made 0 minute, 30 minutes and 60 minutes after smoking of 8 cigarettes. (3 samples)
- Room 2132 (installed PCO air purification system and PAH measurements were made 0 minute, 30 minutes and 60 minutes after smoking of 8 cigarettes. (3 samples)

The PAHs measurement (10 samples) were performed on 29 August, 2012 at Starworld Hotel, Macau.

B. MEASUREMENT METHOD

One set of measurement parameters were PAHs, the harmful health compounds from the cigarettes smoke. The test compounds were Benz(a)pyrene, Benz[a]anthracene & Dibenz[a,h]anthracene. The measurement method will be performed according to the in-house method USEPA TO17 & OHS 58. The air sample was collected in cassette for about 30 minutes in each section in Starworld Hotel, Macau and then collected in cassette for analysis.

According to the two classifications of PAHs with respect to human carcinogenicity by the "International Agency for Research on Cancer (IARC)" and the "Annual report of the committees on Toxicity, Mutagenicity and Carcinogenicity of chemicals in food, consumer products and the environment (COC)" The testing analysis will be the (Benz[a]pyrene, Benz[a]anthracene & Dibenz[a,h]anthracene).

- During the measurement, total 10 samples were collected on 29 August, 2012 at Starworld Hotel, Macau.
- Three different brand names air purification system were installed in three different hotel rooms before the PAH's measurement on 29 August, 2012. Details as follows :

StarWorld Hotel Room Number	Brand names of Air Purification installed
Room 2535	Plasma Air
Room 2536	Biozone
Room 2132	PCO
Room 2630	No installed (Normal condition)

PAHs measurements were made on Room 2535, 2536, 2132 after smoking of 8 cigarettes of each rooms and then the PAHs measurements were performed at each room respectively at 0 minutes, 30 minutes and 60 minutes start smoking of 8 cigarettes. 8 cigarettes are smoked by 4 hotel staff in 4 room same corners so that three smoking conditions are the same.

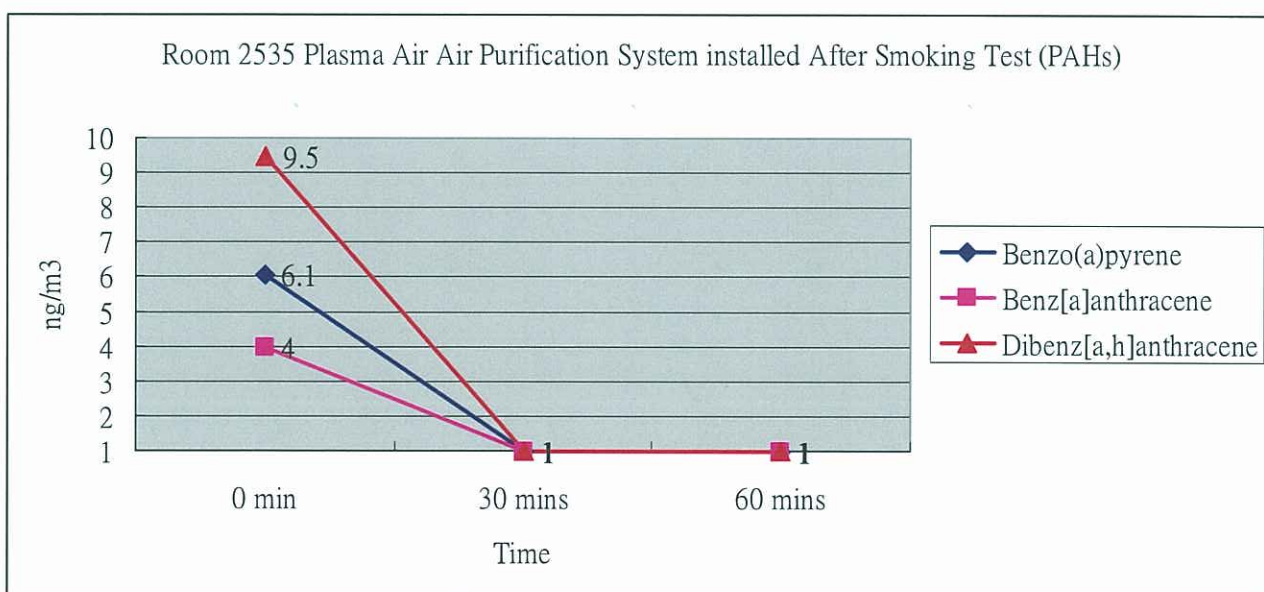
StarWorld Hotel Room Number	Brand names of air Purification installed	PAHs Measurement test Time	Total of PAHs samples were measured
Room 2535	Plasma Air	0 minute, 30 minutes, 60 minutes start smoking of total 8 cigarettes	3
Room 2536	Biozone	0 minute, 30 minutes, 60 minutes start smoking of total 8 cigarettes	3
Room 2132	PCO	0 minute, 30 minutes, 60 minutes start smoking of total 8 cigarettes	3
Room 2630	No installed (Normal condition)	No smoking normal condition	1

C. MEASUREMENT RESULTS

The results of PAHs parameters at the designated locations were measured are shown as following tables:

C. 1 Room 2535 Plasma Air Air Purification System installed After Smoking Test (PAHs)

Parameters			Benzo(a)pyrene	Benz[a]anthracene	Dibenz[a,h]anthracene	Room Temperature	Relative Humidity
Location	Measurement Date	Start smoking time	ng/m ³	ng/m ³	ng/m ³	C	RH
Room 2535 (Plasma Air)	29 Aug, 2012	0 minute	6.1	4.0	9.5	23.2	61
Room 2535 (Plasma Air)	29 Aug, 2012	30 minutes	<1	<1	<1	23.2	61
Room 2535 (Plasma Air)	29 Aug, 2012	60 minutes	<1	<1	<1	23.2	61



D. CONCLUSION

From the above measurement results, the performance and the efficiency of removing the PAHs of Room 2535 (Plasma Air) is the best as the rate of decrease the PAHs is highest which can drop the harmful cigarette smoke the best within 30 minutes after installed the Plasma Air air purification system in the hotel room.

Biozone air purification system can improve the harmful cigarette smoke, but the performance and efficiency of removing the harmful cigarette smoke are comparatively not better than the Plasma Air.

The comparatively poorer performance was the room installed the PCO air purification system.