UNIVERSITÀ DEGLI STUDI DI MILANO

Dipartimento di Chimica Fisica ed Elettrochimica

Messrs.

Graniti Fiandre S.p.A

Via Radici Nord, 112

42014 Castellarano (RE)

Object: White Ground Active – usage with real pollution levels simulation

Directive 2008/50/CE on Ambient Air Quality and Cleaner Air for Europe (1) specifies the measures to be taken in order to avoid, prevent or reduce harmful effects on human health and the environment. The Directive precisely outlines the monitoring needed to determine the concentration level of pollutants in the air, as well as sets maximum values and critical levels for pollutants in order to guarantee public health.

The Directive sets hourly limit values and annual limit values for the protection of human health (NO_2) as well as annual critical levels for the protection of vegetation and natural ecosystems (NO_x):

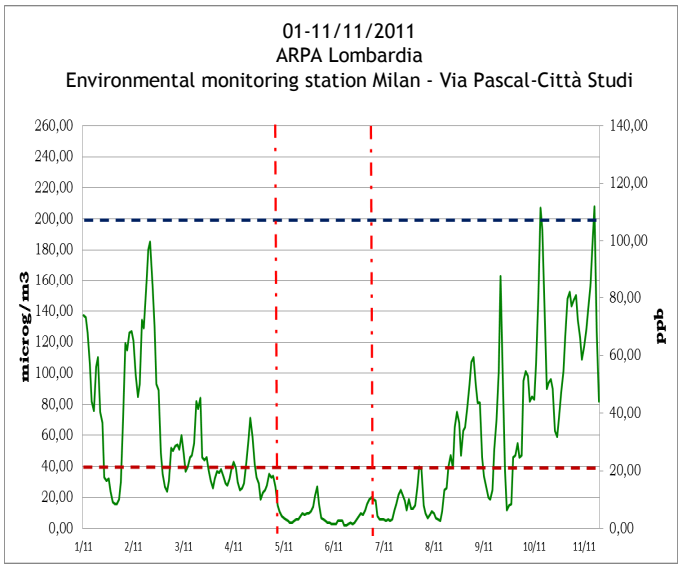
Limit values (Annex XI e XII to the European Directive 2008/50/CE)	
Annual limit value (NO_2)	**40 µg/m^3** *equal to* **21,27 ppb**
Hourly limit value (NO_2) (not to be exceeded more than 18 times in any calendar year)	**200 µg/m^3** *equal to* **106,36 ppb**
Annual critical level for the (NO_x) protection of vegetation and natural ecosystems	**30 µg/m^3** *equal to* **15,95 ppb**
Alert threshold (NO_2)	**400 µg/m^3** *equal to* **212,72 ppb**

Based on this we can conclude that all the measurements performed on White Ground Active (WGA) tiles, carried out strictly following the ISO rules which recommend 1000 ppb of NO_2 (equal to 1880 µg/m^3), show a pollutant concentration significantly higher than the limits set by the EU Directive.

For this reason, WGA tiles were tested with NO_2 levels comparable to those set by the EU Directive, in order to verify the photocatalytic efficiency of the tiles in real conditions, simulating a day without wind (operative conditions: 0.004 m^2 tile, $V_{reactor}$ = 20 L, lamp power UV-A 10 W/m^2 equipped with Wood filter).

Prof. Claudia L. Bianchi
Docente di Chimica Industriale e Impianti Chimici
claudia.bianchi@unimi.it

The lack of circulating air is a key parameter for the test considering it is possible to demonstrate that the wind leads to a natural decrease in the amount of pollutants in the air.



This is illustrated in the chart attached, which shows the development of NO_2 air concentration registered in Milan by Arpa Lombardia from November 1st to 11th, 2011 (environmental monitoring station permanently placed in Via Pascal-Città Studi).

The horizontal blue and red bars show the limits set by the EU Directive.

One can see that, according to the data collected by the environmental monitoring station taken as example, NO_2 levels are always very high, with the exception of November 5th and 6th, 2011, highlighted in the chart by the two vertical bars. These two days were characterized by particular weather conditions: light rain, strong wind at 14 knots (over 25 km/h) and gusts of wind.

Results from photocatalytic tests performed on WGA tiles unmistakably show the efficiency of these materials when used in real pollution conditions.

With a level of NO_2 in line with the hourly limit value (200 μg/m^3), WGA tiles are able to bring the pollutant concentration below the threshold value of 40 μg/m^3 in little more than three hours.
In the extreme case when the nitric oxides concentration values are close to the alert threshold (400 μg/m^3), WGA tiles are able to degrade the pollutant and lower its level to the annual limit value (40 μg/m^3) in 6/7 hours.

To the best of my knowledge and belief,

Prof.sa Claudia L. Bianchi

Milan, November 24th 2011

(1) Acknowledged in the United Kingdom through the Statutory instrument (SI), number: SI 2010 No. 1001; For the other European countries:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:72008L0050:EN:NOT#FIELD_UK

Prof. Claudia L. Bianchi
Docente di Chimica Industriale e Impianti Chimici
claudia.bianchi@unimi.it