

## **Safe Ozone levels**

The following three U.S. Government agencies regulate levels of ozone in air. Their respective values are not identical, for reasons that will become evident – primarily considering the length of time of exposure to specific ozone levels by specific types of individuals.

### **1. Occupational Safety and Health Administration (OSHA)**

This agency (part of the U.S. Department of Labor) regulates the safety and health of factory workers. These are presumed to be in good health, to enable working 8-hrs per day, 5-days per week. For ozone in plant air, OSHA sets the following limitations:

**PERMISSIBLE EXPOSURE LEVEL (PEL):** 0.1 ppm (by weight), time weighted average over an 8-hr day, 5-days per week.

**SHORT TERM EXPOSURE LEVEL (STEL):** 0.3 ppm (by weight) averaged over 15 minutes, not to be exceeded more than twice daily.

**NOTE:** most humans are able to detect ozone in air at levels of ~ 0.02 ppm

### **2. U.S. Food and Drug Administration (FDA)**

This agency of the U.S. Department of Health and Human Services regulates levels of ozone in air for the most sensitive humans – those who are very young, elderly, infirm, confined to rooms, hospitals, nursing homes, etc., or who are immunocompromised. In the early 1970s, FDA determined that ozone levels in air above 0.05 ppm (by wt) are toxic to the sensitive humans cited above (when exposures are 24 hours/day, 7 days/week). On the other hand, ozone concentrations in air below 0.05 ppm (by wt) are not toxic to sensitive humans.

### **3. U.S. Environmental Protection Agency (EPA)**

#### **EPA's Ambient Air Ozone Regulation**

EPA's regulatory responsibility for ozone is for the ambient air breathed by all humans, whether healthy or sensitive. On the other hand, if a regulated level of ozone were to be set for healthy individuals, then sensitive individuals could be affected.

Consequently EPA has set an ambient ozone level in air of 0.08 ppm (previously 0.12 ppm), not to be exceeded more than three times per year.

Singapore adopts the OSHA standard for Industries and 0.05 ppm for Indoor air quality requirements confined to rooms, hospitals, nursing homes, offices etc. The maximum ozone exposure limit of 0.05 ppm is also adopted by ASHRAE for IAQ requirements.

Having understood the safe exposure limits depending on the place of ozone application, ozone systems should be designed with safety features so that the ozone in air concentration never exceeds the standards followed.