

【 Reference 6 】

**Odor Index Regulation and Triangular Odor Bag Method
(brochure)**

Odor Index Regulation and Triangular Odor Bag Method

2003

1995

1972

Office of Odor, Noise and Vibration
Environmental Management Bureau
Ministry of the Environment
Government of Japan

Outline of the Offensive Odor Control Law

In Japan, the Offensive Odor Control Law was enacted in 1972. The law aims to regulate the emission of offensive odors and preserve the living environment of residents.

Application

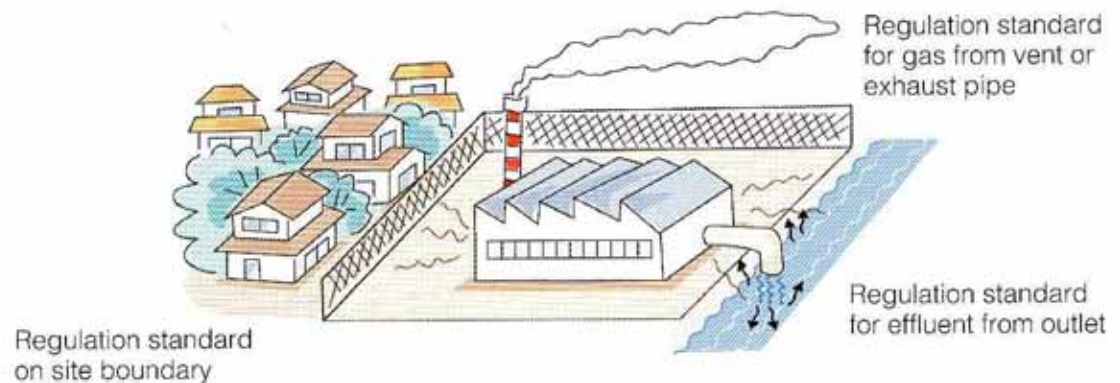
All kinds of factories and workshops within regulated areas designated by local governments based on geographical and demographical conditions are subject to regulation.

Standard

The following 2 systems are used for regulation:

- ▶ Concentration of Offensive Odor Substances
- ▶ Odor Index

Local governments choose either of them and establish 3 applicable regulation standards corresponding to 3 types of odor emissions from factories and workshops.



Implementation

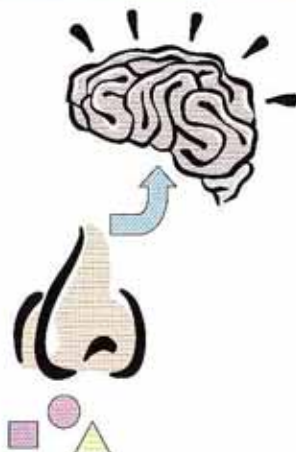
When offensive odor from a factory or workshop exceeds the regulation standard and simultaneously impairs the living environment of residents, local government shall recommend or order the business proprietor to remedy the situation. Penalty shall be imposed on violator



Basic Knowledge

Dose: Offensive Odor Substances

A group of substances that could constitute unpleasant odors and possibly impair the living environment. A total of 22 substances including ammonia and hydrogen sulfide has been designated by the law as Offensive Odor Substances.



Response: Odor Index

An index that quantifies the intensity of odors. Samples are diluted with odor-free air until the odor cannot be detected any longer to determine the dilution rate (odor concentration). The odor index can be calculated by multiplying the common logarithm of the dilution rate by the factor 10.

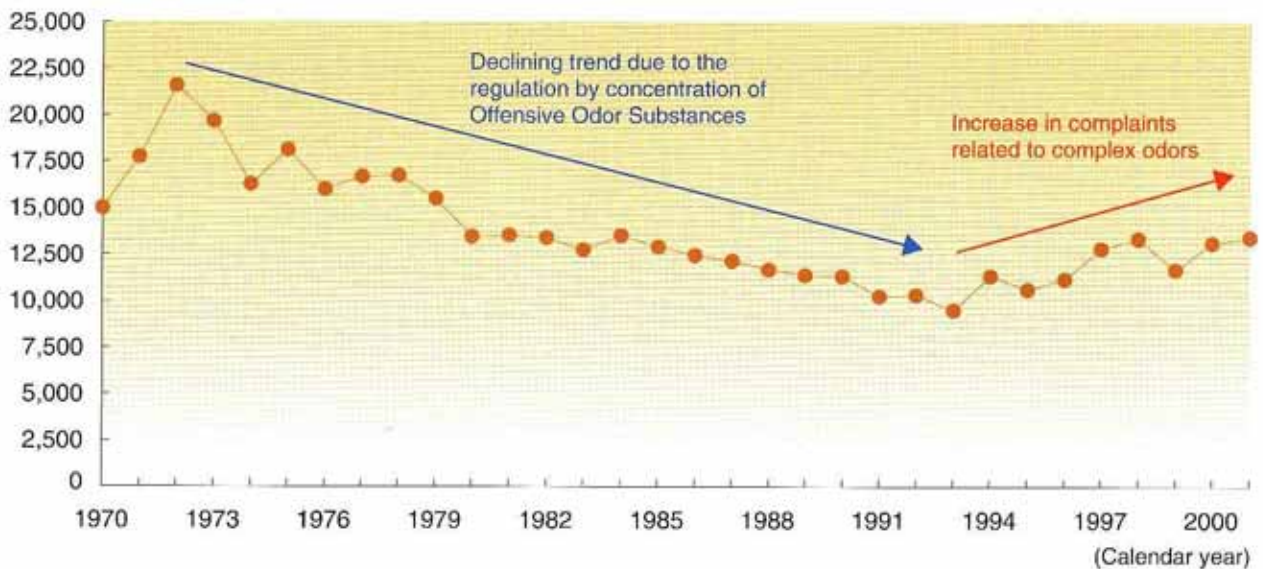
$$\text{odor index} = 10 \times \log (\text{odor concentration})$$



History of Offensive Odor Control in Japan

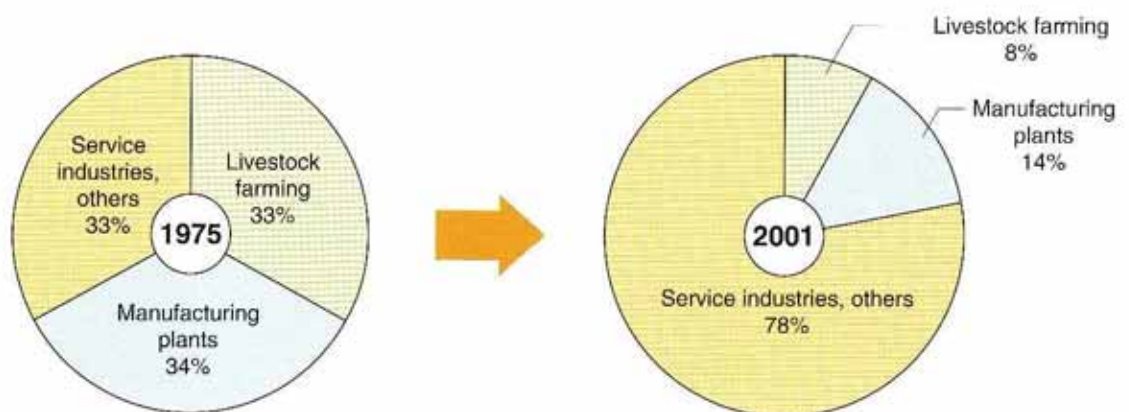
Since the Offensive Odor Control Law took effect in 1972, offensive odor substances have been regulated by their concentrations. Various efforts toward improvement under this law resulted in a decreasing number of complaints. However, the number increased little by little after 1990. One of the causes of this increase is that people have become sensitized to odors generated in daily life. Complaints about livestock farming and manufacturing plants have been decreasing, while those about service industries and private households have been increasing.

(Number of complaints)



Annual changes of complaints about offensive odors (except those related to outdoor incineration)

As the subject of complaints changed in recent years, there was an increasing number of cases that were out of the regulation by concentration of offensive odor substances. To cope with these cases, the Offensive Odor Control Law was revised in 1995 and the odor index regulation was introduced.



Odor index regulation has the following advantages:

- can deal with diverse (more than 400,000) odorants
- can evaluate additive and multiplicative effects of odorants
- can help us imagine the intensity of odor through measurement results
- can meet residents' sense of suffering from offensive odors



Triangular Odor Bag Method

Odor intensity is measured with olfactory measurement methods. In Japan, the "Triangular Odor Bag Method" has officially been adopted for measuring the odor index.

(1) Selection of panel (group of persons who judge the presence of odor with their olfaction)

An aptitude test is conducted using five standard odorants to choose a group of persons without olfaction abnormalities as the panel. To measure the odor intensity precisely and fairly, the panel must be in good health, both physically and mentally. It is important to take panel members' health condition into account and confirm that their olfactory sense is not affected by cold or other illness.



Aptitude Test using Five Standard Odorants:
tastees identify two test strips with odor out of five strips of test papers.



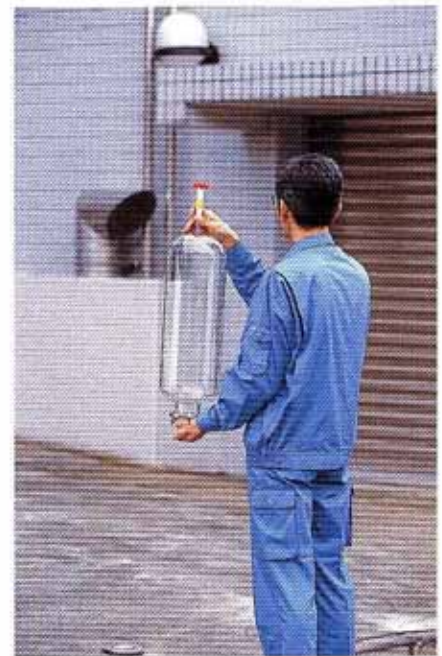
Standard Odorants for Aptitude Test:
There are five standard odors used in the aptitude test including odor "smells like flowers" and odor "smells like sweaty socks."

(2) Sampling

The measurement of the odor index is conducted indoors, using samples from the site in question. It is important that operators of olfactory measurement are sufficiently familiar with the situation at the sampling site and take samples from the location where the smell is most intense.



Since the odor intensity is always changing, the operator has to take samples instantaneously from the location of the most intensive smell, identifying the intensity with his/her own olfaction.



Olfactory Measurement Operator

An olfactory measurement operator is a person in charge of management and organization of the entire series of olfactory measurement from panel selection, sampling, performance of tests and summarizing the results based on the Triangular Odor Bag Method.

This is a National Certification granted to those who passed both the written examination and an aptitude test using five standard odorants. Currently, there are 2,081 certified operators nationwide (as of March 2003). Olfactory measurement operators are allowed to measure the odor index based on the Offensive Odor Control Law when commissioned by local governments.