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**NATIONAL OCCUPATIONAL HEALTH STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GBZ 2.1-2019

Replacing GBZ 2.1-2007

**Occupational exposure limits for hazardous agents in the
workplace-Part 1: Chemical hazardous agents**

工作场所有害因素职业接触限值 第1部分：化学有害因素

(English Translation)

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Foreword

The occupational exposure limits given in Tables 1 to 3 of this part are mandatory; the remaining provisions and the limits given in Table 4 are recommended.

This part is developed in accordance with the Law of the People's Republic of China on Prevention and Control of Occupational Diseases.

GBZ 2 Occupational exposure limits for hazardous agents in the workplace consists of two parts: Part 1: Chemical hazardous agents; Part 2: Physical agents. This part is Part 1 of GBZ 2.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part replaces GBZ 2.1-2007 Occupational exposure limits for hazardous agents in the workplace - Part 1: Chemical hazardous agents. In addition to editorial changes, the main technical changes with respect to GBZ 2.1-2007 are as follows:

- six normative references are added: GBZ/T 300, GBZ/T 192, GBZ/T 295, GBZ/T 224, GBZ/T 225 and GBZ/T 229.2;
- nine terms and definitions relating to occupational exposure are added, the terms of five normative references are deleted, and peak exposure (PE) replaces the excursion limits;
- occupational exposure limits for 28 chemical hazardous agents developed or revised in recent years are added;
- the Chinese or English names and CAS numbers of eight chemical substances are adjusted;
- sensitization labels for 16 substances, skin labels for 4 substances and carcinogenicity

labels for 14 substances are added, and the carcinogenicity labels of 7 substances are adjusted;

- the exposure limits for nitric oxide are incorporated into those for nitrogen dioxide;
- the critical adverse health effects on which the limits are based are listed;
- biological exposure limits (biological monitoring indices and limit values) are added to Clause 4: 28 indices and limits are listed, 13 recently approved biological limit values are added, together with quality requirements for the determination of biological materials and for biological monitoring;
- the requirements for monitoring and determination are improved; for the PC-TWA of total dust and respirable dust, priority is given to the determination of the respirable fraction;
- control principles and requirements for chemical hazardous agents in the workplace are added;
- Annex B is added, giving the chief drafting organizations and drafters of the newly added limits;
- the instructions for correct use in Annex A are refined: control principles, key points and action levels, classification and control of occupational exposure levels and graded management of hazardous work are added, and part of the former Annex A is moved into the body of the standard.

The previous editions of this part are: GBZ 2-2002; GBZ 2.1-2007.

1 Scope

This part specifies the hygiene requirements and the principles of determination, evaluation and control for occupational exposure to chemical hazardous agents in the workplace.

This part is applicable to the hygienic design of industrial enterprises and to the management, control and occupational health supervision and inspection of occupational exposure to chemical hazardous agents in the workplace.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GBZ 1 Hygienic standards for the design of industrial enterprises · GBZ 159 Specifications of air sampling for hazardous substances monitoring in the workplace · GBZ/T 160 (all parts) Methods for determination of toxic substances in the air of workplaces · GBZ/T 192 (all parts) Determination of dust in the air of workplaces · GBZ/T 224 Terms of occupational

health · GBZ/T 225 Guideline for employer of prevention and control of occupational diseases · GBZ/T 229.2 Classification of occupational hazards at workplaces - Part 2: Occupational exposure to chemicals · GBZ/T 295 General principles of biological monitoring method in occupational population · GBZ/T 300 (all parts) Methods for determination of toxic substances in the air of workplaces

3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions given in GBZ/T 224 and the following apply.

3.1 chemical hazardous agents

the chemical substances, dusts and biological agents present in or arising from the workplace

3.2 occupational exposure

the process by which workers, in the course of their occupational activities, are exposed to occupational hazardous agents through the respiratory tract, skin and mucosa

3.3 adverse health effects

harmful health effects or toxic effects on the organism caused by exposure to occupational hazardous agents; only exposure above a certain level, i.e. excessive exposure, causes health damage

3.4 critical adverse health effects

the adverse health effects used to determine the permissible exposure concentration of an occupational hazardous agent, i.e. the effects on which the occupational exposure limit is based

3.5 occupational exposure limits; OELs

the exposure level at which repeated, long-term exposure of workers to one or more occupational hazardous agents in their occupational activities causes no adverse health effects in the vast majority of exposed persons. For chemical hazardous agents the OELs comprise three types: PC-TWA, PC-STEL and MAC

3.5.1 permissible concentration-time weighted average; PC-TWA

the average permissible exposure concentration, weighted by time, for an 8 h working day and a 40 h working week

3.5.2 permissible concentration-short term exposure limit; PC-STEL

the time-weighted average concentration permitted for short exposures (15 min), provided that the PC-TWA for the 8 h working day and 40 h working week is complied with

3.5.3 maximum allowable concentration; MAC

the concentration of a chemical hazardous agent that shall not be exceeded at any time, at any workplace, during the working day

3.6 peak exposures; PE

the highest concentration of a substance in the air measured over the shortest analysable period (not more than 15 min). For agents with a PC-TWA but no PC-STEL, peak exposure is used to control short-term exposure

3.7 exposure level

the concentration or intensity of the occupational hazardous agents to which workers are actually exposed in the workplace during a given period, determined by a standard method

3.8 ratio of occupational exposure level to OELs

the ratio between the actual exposure level of workers to an agent and its occupational exposure limit; for exposure to two or more chemical hazardous agents, the sum of the ratios is called the ratio of mixed exposure

3.9 action level

the actual exposure level at which the employer shall take control measures or actions such as exposure monitoring, occupational health surveillance, training and hazard notification; also called administration level. It usually corresponds to half of the permissible concentration of the agent

3.10 biological monitoring

systematic monitoring of the content of chemical substances or their metabolites in biological materials of workers, such as blood and urine, or of the harmless biological effects they cause, in order to evaluate the degree of exposure and the possible health effects

3.11 biological exposure limits; BELs

the maximum permissible value of chemical substances or their metabolites in workers' biological materials, or of the biological effects they cause; also known as biological