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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB 19041-2024

Safety specifications for the production of phosgene and phosgenation products

光气及光气化产品生产安全规范

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1 Scope

GB 19041-2024 is the Chinese national standard on safety specifications for the production of phosgene and phosgenation products, in the field of chemical technology. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 23 August 2024 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 March 2025. Classification: ICS 71.020, CCS G 09. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the planning, layout, design, production and operation, emergency response, safety requirements for phosgene and phosgenation product production facilities, as well as the production of phosgenation products using diphosgene and triphosgene. This document applies to the production of phosgene and phosgenation products, as well as newly built, expanded, renovated, existing facilities producing phosgenation products using diphosgene and triphosgene.

2 Normative references

The contents of the following documents, through normative references, constitute essential provisions of this document. For dated references, only the version corresponding to that date applies to this document. For undated references, the latest version (including all amendments) applies to this document.

GB 2894 Safety signs and guideline for the use

GB 12158 General requirements for preventing electrostatic accidents

GB 16297 Integrated emission standard of air pollutants

GB 17945 Fire emergency lighting and evacuate indicating system

GB/T 20801 (all parts) Pressure piping code - Industrial piping

GB/T 29639 Guidelines for enterprises to develop emergency response plan for work place accidents

GB 30000.18 Rules for classification and labelling of chemicals - Part

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Key access path Expressways, first-class highways, second-class highways, railway and waterway trunk lines, urban expressways, and other transportation routes.

3.2 Safety distance The minimum permissible distance -- BETWEEN the boundary of the phosgene and phosgenation product production unit (the outermost axis of the unit) AND the relative concentration areas.

3.3 Phosgenation products Products produced by the chemical reaction of phosgene with one or more chemical substances.

3.4 The relative concentration areas Areas where people gather, such as public facilities including residential areas, schools, hospitals, nursing homes, cultural venues, commercial venues, passenger ports, passenger terminals, passenger stations, passenger airports, parks, stadiums, amusement parks, as well as labor-intensive workplaces (workshops or factories with more than 100 workers at any one time), employee dormitories (including shift dormitories).

3.5 Phosgene badge A test paper that indicates a person's exposure to phosgene (the product of exposure concentration and time), by which it can read the exposure dosage using a colorimetric chart.

Note. Phosgene badges are also called phosgene cards or phosgene signboards.

3.6 Fluid containing phosgene A gaseous medium containing at least 0.2% phosgene by volume, or a liquid medium containing at least 1% phosgene by mass.

4.1 Basic requirements

4.1.1 Safety facilities for newly built, expanded, renovated projects shall be designed, constructed, put into production, used simultaneously with the main project.

4.1.2 Phosgene and phosgenation plants shall be designed by an organization with Class A comprehensive engineering design qualification or Class A professional qualification in the chemical, petrochemical, pharmaceutical industries.

4.1.3 A Hazard and Operability Analysis (HAZOP) shall be conducted during the basic design phase for phosgene and phosgenation plants.

4.1.4 Safety assessments (pre-assessment, acceptance assessment, current safety assessment) shall be conducted at different implementation stages for phosgene and phosgenation plants. These safety assessments shall comply with the provisions of AQ 8001; their procedures and content shall adhere to relevant requirements.

4.1.5 Fire protection measures for phosgene and phosgenation product production plants shall comply with the provisions of GB 55037 and GB 50016.Depending on the type of enterprise, they shall also comply with the relevant provisions of GB 50160 and GB 51283.

4.1.6 Exposure limits for toxic and hazardous substances in the workplace during phosgene and phosgenation product production shall comply with the provisions of GBZ 2.1.The overall layout, plant design, auxiliary room configuration shall comply with the requirements of GBZ 1.

4.1.7 Phosgene and methyl isocyanate shall be used immediately upon production and shall not be transported to other locations (including other production plants within the industrial park) or transported via pipelines (including inter-plant pipelines).

4.2 Site layout

4.2.1 Phosgene and phosgenation product production projects shall be located within a chemical park.

4.2.2 The project site layout shall comprehensively consider the total safe amount of phosgene within the chemical park and the bearing capacity of the surrounding environment.

4.2.3 Phosgene and phosgenation product production projects shall undergo risk assessment and demonstration and, while complying with safety requirements, adhere to the principles of industrial agglomeration, centralized layout, intensive land use.

4.3 Site selection

4.3.1 The site selection for phosgene and phosgenation production projects shall comply with the requirements of the national industrial layout and local master plan.

4.3.2 Newly built, expanded, renovated projects must meet the following requirements.

a) They shall not be located in areas with a seismic fortification intensity of 8 degrees or higher (inclusive);

b) They shall be located upwind of densely populated residential areas and towns with the lowest annual wind frequency;

5.1 Process

5.1.1 The water content of carbon monoxide and chlorine gas entering the phosgene synthesis process shall not exceed 50 mg/m3.

5.1.2 Phosgene synthesis and phosgenation equipment and piping systems must be kept dry; no moisture is permitted.

5.1.3 The following measures shall be implemented for cooling the phosgene and phosgenation product production system.

a) Non-aqueous liquids that do not create secondary hazards upon contact with the system media shall be used as coolants. If non-aqueous liquids do not meet process requirements and water or aqueous solutions are necessary as coolants, reliable protective measures shall be implemented to prevent water or aqueous solutions from entering the process material side. In addition, process materials shall be prevented from entering the coolant. An online pH (or conductivity) analyzer with an alarm function shall be installed on the coolant side.

b) When water or aqueous solutions are used as coolants for storage tanks, cooling coils shall not be installed within the tank.

c) When water or aqueous solutions are used as coolants for heat exchangers, shell-and-tube heat exchangers shall utilize double tubesheets.

5.2 Equipment

5.2.1 The design, manufacture, installation, use, inspection and acceptance, repair, modification of pressure vessels shall comply with TSG 21.

5.2.2 Fluid containing phosgene shall be transported by gravity or by leak-proof pumps (such as canned or magnetic drive pumps). If the process requires a mechanical seal pump, a double-end mechanical seal pump with seal flushing shall be used.

5.2.3 The sealing fluid used in pumps containing phosgene shall be compatible with the