

ICS 77.120.01
CCS Z 60



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

GB/T 29999-2026

Replacing GB/T 29999-2013

**Integrated treatment specification for acidic wastewater from
copper mines**

铜矿山酸性废水综合处理规范

Issued on: May 25, 2026

Implemented on: December 1, 2026

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

- 4 Technical Requirements
- 4.1 Source control requirements for acidic wastewater
- 4.3 Other Requirements
- 5 Selection of acidic wastewater treatment process
- 6 Wastewater reuse
- 7 Monitoring and Emissions

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents". Drafting. This document replaces GB/T 29999-2013 "Integrated Treatment Standard for Acidic Wastewater from Copper Mines". Compared with GB/T 29999-2013, except for... Aside from structural adjustments and editorial changes, the main technical changes are as follows:

- a) The scope has been changed to include the collection, transportation, and storage of acidic water in copper mines (see Chapter 1, Chapter 1 of the.2013 edition);
- b) The requirement of "simultaneous mining and restoration" has been added for open-pit mines and spoil heaps (see 4.1.3);
- c) Increased requirements for the collection and transportation of acidic wastewater (see 4.2.1);
- d) Increased requirements for seepage prevention in wastewater storage facilities during the wastewater treatment process (see 4.2.1);
- e) The surface seepage prevention requirements for acidic reservoirs have been revised (see 4.2.2~4.2.4,
- 4.6 in the.2013 edition);
- f) Increased vertical seepage prevention requirements for acidic reservoirs (see 4.2.5);
- g) The requirements for the disposal of neutralized sludge have been changed (see 4.3.3, 4.8 of the.2013 edition);
- h) The requirements for selecting the main wastewater treatment process have been changed (see Table 1, Table 1 in the.2013 edition);

- i) Added process selection options for characteristic pollutants (see 5.3);
- j) The relevant requirements for wastewater reuse and recycled water quality have been revised (see 6.2~6.5,

4.1 Source control requirements for acidic wastewater

4.1.1 Open-pit copper mines should reasonably control the amount of blasting waste rock stockpiles, promptly remove residual rocks and depressions on slopes, and prevent rainwater accumulation. Store in acidified form.

4.1.2 Underground copper mines should seal off abandoned mine shafts to create an anaerobic environment and prevent the generation of acidic wastewater.

4.1.3 Open-pit mines and spoil heaps should be "mined and repaired simultaneously".

4.1.4 In accordance with the principle of "separation of clean water and sewage, and separation of rainwater and sewage", intercepting ditches, drainage ditches and other engineering facilities should be constructed around open-pit mines and spoil heaps.

4.2 Requirements for the collection, transportation, and storage of acidic wastewater

4.2.1 Acidic wastewater should preferably be collected and transported using closed pipelines. If open channels are used for collection and transport, the bottom and sides of the channels should be properly secured. Seepage prevention treatment. The bottom and sides of acidic wastewater storage facilities such as acidic wastewater collection tanks, reaction tanks, and emergency accident tanks should be protected against seepage. The seepage prevention measures should comply with the requirements of GB 50988.

4.2.2 Acidic reservoirs should be treated for seepage prevention, and the effectiveness of seepage prevention projects should be evaluated and seepage prevention technologies should be compared and selected.

4.2.3 New and expanded acidic reservoirs should adopt surface seepage prevention technology. Existing and renovated acidic reservoirs should adopt surface seepage prevention technology or vertical seepage prevention technology. Technology. If necessary, a combination of surface seepage prevention and vertical seepage prevention techniques can be adopted.

4.2.4 The technical requirements for ground seepage prevention are as follows:

a) A single artificial composite lining should be used as a seepage-proof lining at the bottom and around the perimeter of acidic reservoirs; (b) Synthetic materials should be made of high-density polyethylene (HDPE) film with a thickness of not less than

1.5 mm, and should meet the requirements of GB/T 17643. The performance requirements are as follows: For materials using other synthetic materials, the impermeability must be at least equivalent to that of a 1.5mm high-density polyethylene membrane. performance;

c) The thickness of the clay lining should be no less than 0.75m, and the saturated permeability coefficient after compaction, artificial modification, and other treatments should be no greater than [missing value]. $1.0 \times 10^{-7} \text{cm/s}$; When using other clay-based impermeable lining materials, they should have the same or higher water-proofing effect.

4.2.5 The technical requirements for vertical seepage prevention are as follows:

a) Vertical impermeable walls should be placed at the outlet where groundwater flow is blocked, and should preferably extend at least 2.0m into the relative impermeable layer;

4.3 Other Requirements

4.3.1 Acidic wastewater should be treated and reused separately according to its quality.

4.3.2 An emergency response system should be established to prevent the discharge of acidic wastewater.

4.3.3 The neutralized sludge and equipment scale generated from acidic wastewater treatment shall comply with GB 5085 (all parts), GB 5086.1, and HJ557. Identify its properties according to the provisions of HJ298 and GB 34330; take measures for reduction, resource utilization and harmless treatment according to the properties of sludge, and give priority to For use in mine ecological restoration projects, materials that cannot be comprehensively utilized should be sent to qualified units for comprehensive recycling or safe disposal. Enterprises that dispose of materials themselves must meet the following requirements. The provisions of GB 18597, GB 18598 and GB 18599.

5 Selection of acidic wastewater treatment process

5.1 Based on the characteristics of acidic wastewater, a wastewater treatment process capable of stably treating it to meet discharge standards and facilitating reuse should be selected. Acidic wastewater... The main water treatment processes are shown in Table 1.

5.2 For the treatment of acidic wastewater, priority should be given to treatment processes that recover valuable metals or utilize them comprehensively.

5.3 In areas with special emission requirements for characteristic pollutants such as thallium and manganese, it is advisable to add advanced oxidation and nano-adsorption processes to the conventional treatment process. Pre-processing or deep processing devices.

6 Wastewater reuse

6.1 Acidic wastewater should be reused after treatment; wastewater that cannot be recycled should be discharged in compliance with standards.

6.2 When reusing effluent from lime neutralization and high-concentration slurry methods, it

is advisable to periodically employ measures such as chemical scale inhibition, ion exchange, and biological scale inhibition to mitigate the effects of lime scale. Scaling and corrosion of pipelines and equipment during transportation and use.

6.3 When recycled water is used for spoil heaps, road dust suppression and wet dust collection, it shall comply with the provisions of GB 50988.

6.4 When recycled water is used as boiler feedwater, it should be further treated with softening, desalination, and ion exchange according to the boiler operating conditions until it reaches the required level. The boiler water quality must meet the standards for the corresponding operating conditions. For low-pressure boilers, the water quality should meet the standards for boiler feedwater in Table 5 of GB/T 1576-2018. Quality requirements. For medium-pressure boilers, the water quality should meet the boiler feedwater quality requirements in Table 2 of GB/T 12145-2016; for hot water boilers... For grid-connected and thermal extraction boilers, the water quality should meet the relevant industry standards.

6.5 When recycled water is used as process water, it shall meet the water quality requirements of GB/T 19923 or the relevant process and product water quality standards.

6.6 Users of recycled water should manage the use of recycled water, including monitoring water quality stability, water quality and quantity, and the transmission network and water-using equipment. Control and other related tasks.

6.7 Reclaimed water pipes shall be painted with a color that distinguishes them from fresh water pipes, and shall be marked with the words "Reclaimed Water". 6.8 "No Drinking" signs should be posted at the water points of the recycled water pipeline to prevent accidental drinking or misuse.

7 Monitoring and Emissions

7.1 The effluent sampling and monitoring point should be located at the outlet of the wastewater treatment facility, and a monitoring plan should be formulated to regularly sample the effluent in accordance with the requirements of HJ819. The quality was sampled, monitored, and analyzed.

7.2 The discharge outlet for wastewater shall be equipped with metering and online monitoring devices and comply with the provisions of HJ353, HJ355 and HJ212.

7.3 Wastewater discharge shall meet the requirements of GB 25467. In areas with special discharge requirements for characteristic pollutants, local discharge standards shall also be met. Standard requirements.

7.4 The methods for monitoring and analyzing pollutants in discharged wastewater shall comply with the provisions of GB 25467.