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**Reuse of urban recycling water - Water quality standard for  
industrial uses**

城市污水再生利用 工业用水水质

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## Table of Contents

|                                 |   |
|---------------------------------|---|
| 1 Scope .....                   | 1 |
| 2 Normative references .....    | 1 |
| 3 Terms and definitions .....   | 2 |
| 4 Water quality indices .....   | 3 |
| 5 Sampling and monitoring ..... | 4 |
| 6 Safe use .....                | 8 |

### 1 Scope

The document fixes the water quality indices, the sampling and monitoring and the safe use of reclaimed urban wastewater used as industrial water.

It applies to reclaimed water used as the raw water of industrial processes in the form of make-up water for indirect open recirculating cooling systems, boiler make-up water, process water and water used in products, once-through cooling water and washing water.

### 3 Terms and definitions

3.1 Municipal wastewater is the collective name for domestic sewage, industrial wastewater allowed into the sewer, infiltrating groundwater and, in a combined system, the intercepted stormwater.

3.2 Reclaimed water is water obtained by treating municipal wastewater through a suitable reclamation process so that it meets a defined water quality and a given use, and can be put to beneficial use.

3.3 to 3.5 Fresh water is fresh water taken from the natural environment or supplied by a municipal waterworks. Make-up water for recirculating cooling water is water added to replace the losses of a recirculating cooling system in operation. An indirect open recirculating cooling water system is one in which the cooling water exchanges heat with the cooled medium indirectly and gives up its heat in direct contact with the atmosphere.

3.6 to 3.10 Once-through cooling water is cooling water discharged directly after a single use. Washing water is water used in industry for slag flushing, ash flushing, smoke and dust suppression and cleaning. Boiler make-up water replaces the steam and water losses of a boiler and its heating system. Process water is used to manufacture or work a product and in the operations connected with that manufacture. Water used in product is water that enters the product directly.

3.11 Raw water for industrial uses is the raw water of the recirculating cooling make-up, boiler make-up, process and product, once-through cooling and washing uses, which according to the needs of production may be used directly, used as a blend or used after further treatment.

## 4 Water quality indices

4.1 Control items are divided into basic control items and selective control items. Every reclamation plant supplying raw water for industrial uses meets the basic control items, and applies the selective control items according to the pollutant content of the source water and the requirements of the industrial user.

4.2 The basic control items and their limits meet Table 1 and the selective control items and their limits meet Table 2. Beyond Table 1, industrial water also meets the limits given in GB 18918-2002 for the first class of pollutants and for its selective control items.

Table 1 has two limit columns. The first covers make-up water for indirect open recirculating cooling systems, boiler make-up water, process water and water used in products; the second covers once-through cooling water and washing water. Where a row carries two values the first belongs to the first column and the second to the second; where a row carries one value the cell spans both columns; and a dash means no requirement, as the note to the table states.

The basic control items are: pH, dimensionless, 6.0 to 9.0; colour, 20 degrees; turbidity, 5 NTU for the first group and no requirement for the second; five-day biochemical oxygen demand 10 mg/L; chemical oxygen demand 50 mg/L; ammonia nitrogen as nitrogen 5 mg/L; total nitrogen as nitrogen 15 mg/L; total phosphorus as phosphorus 0.5 mg/L; anionic surfactant 0.5 mg/L; petroleum substances 1.0 mg/L; total alkalinity as calcium carbonate 350 mg/L; total hardness as calcium carbonate 450 mg/L; total dissolved solids 1000 and 1500 mg/L; chloride 250 and 400 mg/L; sulfate 250 and 600 mg/L; iron 0.3 and 0.5 mg/L; manganese 0.1 and 0.2 mg/L; silicon dioxide 30 and 50 mg/L; faecal coliforms 1000 MPN/L; and total residual chlorine 0.1 to 0.2 mg/L. Two footnotes add that where the water is make-up for an indirect open recirculating cooling system whose heat exchanger is of copper alloy the ammonia nitrogen is below 1 mg/L, and that the total residual chlorine value is the value in the reclaimed water at the connection with the user's pipework.

Table 2 gives the two selective control items in milligrams per litre: fluoride as fluorine at 2.0 and sulfide as sulfur at 1.0.

## 5 Sampling and monitoring

5.1 The organisation and design of water quality sampling follow HJ 494 and HJ 495. The sample is a 24 h composite, taken at least once every 2 h and reported as a daily mean. Preservation of the samples follows HJ 493. A sampling point for water quality monitoring is

recommended at the outlet of the reclamation plant.

5.2 The methods of analysis for the basic control items follow Table 3 and those for the selective control items Table 4. Each table lists, for every item, the determination methods available and the standard that carries each one. For pH these are the potentiometric method of CJ/T 51, the electrode method of HJ 1147 and the glass electrode method of GB/T 6920; for colour the platinum-cobalt visual method of CJ/T 51 and the platinum-cobalt colorimetric method of GB/T 11903; for turbidity the turbidimeter method of HJ 1075; for five-day biochemical oxygen demand the dilution and inoculation method of HJ 505, CJ/T 51 and GB/T 7488; and so on down the twenty basic items, ending with total residual chlorine by the on-site method of CJ/T 51 and by the N,N-diethyl-1,4-phenylenediamine spectrophotometric and titrimetric methods. Table 4 lists the methods for fluoride and sulfide in the same way. Both tables carry two notes: the supplier and the user of the reclaimed water agree the arbitration method in their contract, and methods with less effect on the environment and on human health are encouraged.

5.3 The monitoring frequency of the basic control items for raw water for industrial uses is not lower than Table 5. Daily monitoring applies to pH, colour, turbidity, chemical oxygen demand, ammonia nitrogen, total phosphorus, total dissolved solids and total residual chlorine. Weekly monitoring applies to five-day biochemical oxygen demand, total nitrogen, anionic surfactant, petroleum substances, total alkalinity, total hardness, chloride, sulfate, iron, manganese, silicon dioxide and faecal coliforms.

## 6 Safe use

6.1 Manner of use. Reclaimed water used as once-through cooling water or washing water may be used directly once it meets the control indices of Tables 1 and 2. Where it is used as make-up water for an indirect open recirculating cooling system, boiler make-up water, process water or water used in products and, having met those indices, still does not meet the needs of the use, it is treated further or blended with fresh water up to the corresponding standard before use. Where it is used as industrial recirculating cooling water, the testing and management of the cooling system follow GB/T 50050.

6.2 Principles of use. The source for a reclamation plant is preferably the effluent of a municipal wastewater treatment plant taking domestic sewage or municipal wastewater free of heavily polluting or toxic and harmful industrial wastewater. The distribution system of the reclaimed water is not connected directly to a drinking water or private source distribution system. The distribution system is provided with means of emptying, and the emptying and overflow pipes of the balancing tank are not connected directly to a drainage pipe. Where the supply pipe joins the balancing tank with a submerged outlet, an anti-backflow device is fitted. Reclaimed water is not used in the food industry or for water used in products that come into close contact with the body.

6.3 Marking. A durable warning mark reading that the reclaimed water is not to be drunk is

placed at the draw-off points and taps of the reclaimed water pipework. A durable reclaimed water mark is placed in a conspicuous position on every component and ancillary structure of the distribution network; exposed reclaimed water pipes carry an identifying colour and a reclaimed water pipe mark, and buried reclaimed water pipes carry a durable marker tape laid above them.

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