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

DL/T 771-2014

**Guideline for the selection of ion exchange resins used in
power plant water treatment systems**

发电厂水处理用离子交换树脂选用导则

(English Translation)

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1 Scope

This standard specifies the principles for selecting ion exchange resins (hereinafter referred to as resins) for water treatment systems in thermal power plants and nuclear power plants.

This standard applies to the selection of granular resins used in water treatment systems of thermal power plants and nuclear power plants.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document;

for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 11991 Determination of reversible swelling of exchange resins

GB/T 12598 Determination for sphericity of ion exchange resins after attrition or osmotic-attrition

DL/T 519-2014 Acceptance criterion for ion exchange resins used in water treatment in power plants

DL/T 801 Requirements of water quality and internal cooling water system for large generator

DL/T 953 Determination for heat resistance of strongly basic anion exchange resins used in water treatment

DL/T 1039 Directive for electric power generator inner cooling water treatment

DL/T 5068 Technical code for designing chemistry of fossil fuel power plants

3 Terms and definitions

The following terms and definitions apply to this document.

The pressure at which a resin particle fractures when subjected to uniform compression.

The crushing strength of a resin batch is typically expressed by the average crushing strength of a specified number of particles and the percentage of particles exceeding the specified crushing strength.

4.1.1 Makeup water treatment

For makeup water treatment systems in thermal and nuclear power plants, weak-acid, strong-acid, weak-base, or strong-base resins may be selected based on the characteristics of the source water and the specific features of the ion exchange demineralization units employed.

4.1.2 Condensate polishing

For ion exchange units in the secondary-side condensate polishing systems of thermal and nuclear power plants, strong-acid and strong-base resins should be used.

4.1.3 Water treatment for nuclear power plant's primary circuits and auxiliary systems

For systems requiring high resin exchange capacity, gel-type nuclear-grade resins should be used; for purification systems requiring high particle adsorption and filtration capabilities, macro-porous nuclear-grade resins should be used.

4.1.4 Circulating cooling water treatment

For ion exchange units used in makeup water treatment and side-stream purification for circulating cooling water systems, weak-acid cation resins should be selected.

4.1.5 Generator internal cooling water treatment

For ion exchangers treating generator internal cooling water, strong-acid and strong-base resins should be used.

4.2 Selection of make-up resin

When replenishing resin for ion-exchange water treatment equipment, it should select resin of the same designation and from the same manufacturer as that currently in use.

If this is not possible, the replacement resin should have technical specifications, such as exchange capacity, physical and chemical stability, uniformity coefficient, that are not inferior to the original resin, meanwhile its other basic performance indicators shall be substantially similar to those of the original resin.

4.3 Selection of resin ionic form

4.3.1

For make-up water treatment systems, the ionic form of the resin should be the standard form. sodium form for strong-acid cation resins, chloride form for strong-base anion resins, hydrogen form for weak-acid cation resins, free-amine form for weak- base anion resins.

4.3.2 For condensate polishing systems in nuclear power plants, strong-acid cation

resins should be in the hydrogen form, strong-base anion resins should be in the hydroxide form.

4.3.3 For water treatment systems serving the primary circuit and auxiliary systems of

nuclear power plants, nuclear-grade resins should be selected. These may be in the hydrogen, lithium, potassium, or hydroxide forms, or in mixed forms such as hydrogen/hydroxide, lithium/hydroxide, or potassium/hydroxide.

4.3.4 For generator internal cooling water treatment systems, strong-acid cation resins

should be in the hydrogen or sodium form, strong-base anion resins should be in the hydroxide form.

Note: When determining the order quantity for resin, the impact of volume changes, which are caused by ionic form conversion during resin regeneration and exchanger operation, on the procurement volume shall be taken into account. The resin conversion expansion rate shall be determined in accordance with the method specified in GB/T 11991.

5.1 For the cation and anion beds in the primary demineralization ion-exchange units

of make-up water treatment systems, it should use 001x7 strong-acid cation resin and

201x7 or 201x4 strong-base anion resin.

5.2 For mixed-bed units in makeup water treatment systems, it should use 001x7MB strong-acid cation resin and 201x7MB strong-base anion resin; alternatively, high-strength D001 and D201 resins or gel-type uniform-particle-size resins may be used.

5.3 The strong-acid cation resin and strong-base anion resin used in the mixed bed need not both be of the macro-porous type or both of the gel type.

5.4 When a mixed-bed unit is not installed downstream of the primary demineralization system, it should use Type I strong-base anion resin for the anion exchange bed.

5.5 Acrylic-based strong-base anion resins should not be used, when the water temperature in the treatment system exceeds 35 °C.

5.6 Resins from other brands may also be used in makeup water treatment systems, provided their physicochemical and operational performance indicators meet the technical requirements of the respective water treatment units.

6.1.1 Macro-porous strong-acid cation and strong-base anion resins used in condensate

polishing mixed beds shall comply with the requirements for D001MBP and D201MBP specified in DL/T 519-2014.

6.1.2 Macro-porous strong-acid cation and strong-base anion resins used in separate

cation and anion beds (arranged in series) for condensate polishing shall comply with the requirements for D001P and D201P specified in DL/T 519-2014.

6.1.3 For gel-type strong-acid cation and strong-base anion resins used in condensate

polishing mixed beds, the uniformity coefficient shall not exceed 1.3; the strength shall comply with the technical requirements for 001MBP and 201MBP specified in DL/T

519-2014; other indicators shall comply with the requirements for 001x7MBP and

201x7MBP specified in DL/T 519-2014.

6.1.4 For cation and anion exchange beds in a series single-bed condensate polishing

system, gel-type strong-acid and strong-base resins shall be used. Their strength shall meet the requirements for 001P or 201P resins specified in DL/T 519-2014; other parameters shall comply with the technical requirements for 001x7P and 201x7P resins