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**The norm of energy consumption per unit product of polyvinyl
chloride resin**

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1 Scope

The standard lays down the technical requirements, the statistical scope and the calculation method, and the energy saving management and measures for the limits of the energy consumption per unit product of polyvinyl chloride resin, energy consumption being abbreviated in the text.

It applies to the calculation and the assessment of the energy consumption of polyvinyl chloride resin producing enterprises and to the control of the energy consumption of newly built projects.

2 Normative references

The following documents are indispensable for the application of the document. For dated references only the dated edition applies; for undated references the latest edition, all its amendments included, applies.

GB/T 2589 General principles for calculation of the comprehensive energy consumption;
GB/T 5761 Suspension method general purpose polyvinyl chloride resin; GB/T 12497 Economical operation of three-phase asynchronous motors; GB/T 12723 General principles for compiling the norm of energy consumption per unit product; GB/T 13462 Economical operation for power transformers; GB/T 13466 Economical operation general principles for alternating current electric drive fan, pump and air compressor systems; GB 15592 Polyvinyl chloride resin for paste; GB 17167 General principles for equipping and managing the measuring instruments of energy in the organization of energy using.

3 Terms and definitions

The terms and definitions given in GB/T 12723 and the following ones apply to the document.

3.1 polyvinyl chloride resin, PVC - a thermoplastic high polymer obtained by polymerizing vinyl chloride monomer. The note adds that general purpose and paste polyvinyl chloride resins are both covered: general purpose resin is obtained from vinyl chloride monomer by suspension polymerization and by bulk polymerization, paste resin by emulsion polymerization and by micro-suspension polymerization.

3.2 carbide-based PVC - polyvinyl chloride resin synthesized by polymerization, where acetylene is produced from calcium carbide and vinyl chloride is produced from acetylene and hydrogen chloride.

3.3 ethylene-based PVC - polyvinyl chloride resin synthesized by polymerization, where vinyl chloride is produced from ethylene, chlorine and other raw materials.

3.4 monomer-based PVC - polyvinyl chloride resin synthesized by polymerization from vinyl chloride monomer as raw material.

3.5 combination method PVC - polyvinyl chloride resin synthesized by polymerization from dichloroethane and calcium carbide as raw materials.

3.6 the comprehensive energy consumption of product polyvinyl chloride resin - the total of the various energy consumptions actually spent on production, within the reporting period and inside the production boundary of the polyvinyl chloride resin plant. The note explains that this total is the sum of the energy consumption and the losses of the production system, the auxiliary production system and the ancillary production system, and that it excludes the energy consumed by capital construction and technical renovation projects and the energy recovered and reused inside the boundary or exported outside it.

3.7 comprehensive energy consumption per unit product of polyvinyl chloride resin - the comprehensive energy consumption expressed per unit output of polyvinyl chloride resin, the vinyl chloride unit and the polymerization unit included.

3.8 comprehensive energy consumption of per unit product of vinyl chloride unit of polyvinyl chloride resin - the comprehensive energy consumption of the vinyl chloride unit expressed per unit output of vinyl chloride, the consumption of the polymerization, drying and other units excluded.

3.9 comprehensive energy consumption of per unit product of polymerization unit of polyvinyl chloride resin - the comprehensive energy consumption of the polymerization unit expressed per unit output of polyvinyl chloride resin, the consumption of the vinyl chloride unit excluded.

4 Technical requirements

4.1 Limit values. The energy consumption limit values per unit product of existing polyvinyl chloride resin producing enterprises shall comply with Table 1.

Table 1 has three columns: product name and production method, comprehensive energy consumption per unit product of general purpose polyvinyl chloride resin in kgce/t, and comprehensive energy consumption per unit product of paste polyvinyl chloride resin in kgce/t. Carbide-based polyvinyl chloride resin: not greater than 285 and not greater than 500. Ethylene-based polyvinyl chloride resin: not greater than 640 and not greater than 1 150. Monomer-based polyvinyl chloride resin: not greater than 230 and not greater than 435. Footnote a states that the combination method follows the figures of the ethylene method.

4.2 Access values. The energy consumption access values per unit product of newly built and of rebuilt or extended polyvinyl chloride resin producing enterprises shall comply with Table 2, which has the same three columns. Carbide-based resin: not greater than 193 and not greater than 450. Ethylene-based resin: not greater than 620 and not greater than 950. Monomer-based resin: not greater than 175 and not greater than 385.

4.3 Advanced values. The energy consumption advanced values per unit product of polyvinyl chloride resin producing enterprises shall meet the requirements of Table 3. Table 3 has the same three columns and, as printed, carries the same figures as Table 2: carbide-based resin not greater than 193 and not greater than 450; ethylene-based resin not greater than 620 and not greater than 950; monomer-based resin not greater than 175 and not greater than 385.

5 Statistical scope and calculation method

5.1.1 The production system boundary is drawn for each production method: for carbide-based resin it runs from the entry into the process of calcium carbide, chlorine, hydrogen and other raw materials to the weighing of the finished resin into store; for ethylene-based resin from the entry of ethylene, chlorine and other raw materials; for monomer-based resin from the entry of vinyl chloride and other raw materials; for the combination method from the entry of dichloroethane, calcium carbide and other raw materials. In each case the boundary takes in the complete process and equipment of the works concerned.

5.1.2 The auxiliary production system covers the processes, facilities and equipment provided for the process units of the production system, power, electricity supply, machine repair, water supply, gas supply, steam, heating, refrigeration, instruments, the raw material yard of the plant and the safety and environmental protection installations among them.

5.1.3 The ancillary production system covers the production command system of the works

and the departments and units serving production inside the plant area, offices, operating rooms, rest rooms, changing rooms, bathhouses, central control analysis, finished product inspection and equipment maintenance among them.

5.1.4 The production boundary is made up of the three parts: production system, auxiliary production system and ancillary production system facilities.

5.1.5 The energy consumption of the production system shall cover the primary and secondary energy actually consumed inside the production boundary. Working media such as water, oxygen, nitrogen and compressed air, whether bought or self-produced, shall not be counted in the energy consumption.

5.1.6 The energy consumption of the auxiliary and ancillary production systems of the enterprise that is not included inside the production boundary shall be apportioned to polyvinyl chloride resin and to the other production systems in proportion to consumption.

5.1.7 Waste heat, surplus energy and heat of chemical reaction recovered and reused inside the production boundary shall not be counted in the energy consumption; energy supplied to installations outside the boundary shall be deducted from the boundary consumption according to the energy actually sent out.

5.1.8 The various energies shall be converted to the uniform unit of measurement, tonnes of standard coal, according to GB/T 2589. The calorific values shall be those measured by the enterprise during the reporting period; where no measurement is possible, the reference coefficients for the conversion of each energy to standard coal given in Annex A shall be used.

5.1.9 The statistics and the accounting of the energy consumption shall cover every production stage and system, without duplication and without omission.

5.2 Calculation method. 5.2.1 states that the comprehensive energy consumption per unit product of general purpose and of paste polyvinyl chloride resin shall be accounted for according to the production methods laid down in Table 1. Formulas (1) and (2) of 5.2.2.1 and formula (3) of 5.2.2.2 give that consumption; the printed symbols are: E_{zh} , the comprehensive energy consumption per unit product of general purpose or paste polyvinyl chloride resin in the reporting period, in kilograms of standard coal per tonne (kgce/t); E_{lx} , the comprehensive energy consumption per unit product of the carbide method vinyl chloride unit, in kgce/t; E'_{lx} , the same quantity for the ethylene method vinyl chloride unit, in kgce/t; P , the quantity of vinyl chloride actually consumed per unit product of general purpose or paste polyvinyl chloride resin, in tonnes per tonne (t/t); E_{jh} , the comprehensive energy consumption per unit product of the polymerization unit, in kgce/t. For the monomer method, formula (3) makes the consumption per unit product equal to that of the polymerization unit alone.