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**The norm of energy consumption per unit product of vinyl
acetate**

乙酸乙烯酯单位产品能源消耗限额

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1 Scope

The document sets the technical requirements, the statistical boundary and calculation method, and the energy-saving management and measures for the energy consumption per unit product (energy consumption for short) of vinyl acetate (acetic acid vinyl ester) produced by the acetylene route and by the ethylene route.

It applies to the calculation and the assessment of energy consumption per unit product in enterprises producing vinyl acetate by those two routes, and to the control of energy consumption of newly built plants.

2 Normative references

Dated references apply in the edition cited; undated references apply in their latest edition, amendments included.

GB/T 2589 General principles for calculation of the comprehensive energy consumption; GB/T 12497 Economical operation for three-phase asynchronous motor; GB/T 12723 General principles for compiling norms of energy consumption per unit product; GB/T 13462 Economical operation for power transformers; GB/T 13466 General principles for economical operation of alternating-current electric drive fan (pump, air compressor) systems.

GB 17167 General principles for equipping and managing of the measuring instrument of energy in organization of energy consumption; GB 18613 Minimum allowable values of energy efficiency and energy efficiency grades for small and medium three-phase asynchronous motors; GB 19153 Minimum allowable values of energy efficiency and energy efficiency grades for displacement air compressors; GB 19761 Minimum allowable values of energy efficiency and energy efficiency grades for ventilation fans; GB 19762 Minimum allowable values of energy efficiency and evaluating values of energy conservation for clean water centrifugal pumps; GB 20052 Minimum allowable values of

energy efficiency and energy efficiency grades for three-phase distribution transformers;
SH/T 1628.1-1996 Vinyl acetate for industrial use.

3 Terms and definitions

The terms defined in GB/T 12723 apply together with the following.

3.1 the comprehensive energy consumption of vinyl acetate - within the reporting period, the total quantity of the various forms of energy actually consumed in the whole production process of the vinyl acetate product. The English wording is the one printed in the document.

3.2 the comprehensive energy consumption per unit product of vinyl acetate - the comprehensive consumption of the vinyl acetate product expressed per unit of output.

3.3 the production process of acetylene method - the process route in which acetylene obtained by hydrolysis of calcium carbide or by cracking of natural gas is the raw material, and the vinyl acetate product is obtained through a synthesis section and a rectification section.

3.4 the production process of ethylene method - the process route in which ethylene obtained by petroleum cracking or by dehydration of biomass ethanol is the raw material, and the vinyl acetate product is obtained through a synthesis section and a rectification section.

4 Technical requirements

4.1 Limit value of energy consumption per unit product of vinyl acetate. The limit values for existing vinyl acetate production plants are to conform to Table 1, which is expressed as comprehensive energy consumption per unit product in kgce/t: acetylene route not more than 565, ethylene route not more than 410.

4.2 Access value of energy consumption per unit product of vinyl acetate. Newly built and rebuilt or extended vinyl acetate plants are to conform to Table 2, in the same unit: acetylene route not more than 485, ethylene route not more than 250.

4.3 Advanced value of energy consumption per unit product of vinyl acetate. Table 3 gives, in the same unit, not more than 410 for the acetylene route and not more than 240 for the ethylene route.

5 Statistical boundary and calculation method

5.1.1 The statistical boundary of the comprehensive energy consumption of the vinyl acetate product runs from the point where raw materials (acetic acid, acetylene or ethylene) and energy are metered into the synthesis process to the point where the finished vinyl acetate is metered into store. It is made up of three parts: energy consumption of the

production system, of the auxiliary production system and of the ancillary production system.

a) Energy consumption of the production system covers the vinyl acetate synthesis section and the vinyl acetate rectification section.

b) Energy consumption of the auxiliary production system covers the processes, installations and equipment serving the production system, chiefly power supply, machine repair, water supply, gas supply, heat supply, refrigeration, instrument repair, lighting, warehouses and the in-plant raw material yard, together with safety, environmental protection and energy-saving facilities.

c) Energy consumption of the ancillary production system covers the production command system set up specifically for the production system (the plant management level) and the departments and units inside the plant area serving production, chiefly the dispatching room, offices, operating rooms, control rooms, rest rooms, changing rooms, bathhouse, central control analysis, product inspection and the maintenance section.

5.1.2 Waste heat, residual energy and heat of chemical reaction produced in vinyl acetate manufacture and then recovered and used are not to be counted into the energy consumption. Where such waste heat, residual energy or reaction heat is supplied to other plants, the energy actually used is to be deducted from the energy consumption of this system.

5.2.1 The calculation of the comprehensive energy consumption conforms to GB/T 2589.

5.2.2 The calorific values of the various forms of energy are converted to a single unit of measure, kilogram of standard coal (kgce). The calorific value used is the one measured by the enterprise within the reporting period; where measurement is not possible, the standard coal conversion reference coefficients of Annex A or Annex B may be used.

5.2.3 The comprehensive energy consumption of the vinyl acetate product, E , is the total of the various forms of energy consumed in the production process less the total of the various forms of energy exported outwards, expressed in kilograms of standard coal (kgce) and calculated by formula (1). The formula is not reproduced here; its symbols are E , the value of the comprehensive energy consumption of vinyl acetate, in kgce; e_{ic} , the physical quantity of the i -th form of energy consumed in producing the vinyl acetate product; e_{jf} , the physical quantity of the j -th form of energy exported during production; K_i , the standard coal conversion coefficient of the i -th input energy; K_j , the standard coal conversion coefficient of the j -th output energy; m , the number of kinds of energy input; n , the number of kinds of energy output.

5.2.4 The comprehensive energy consumption per unit product of vinyl acetate, e , is the comprehensive energy consumption of vinyl acetate within the reporting period divided by the vinyl acetate output within the same period, expressed in kilograms of standard coal per

tonne (kgce/t) and calculated by formula (2). Its symbols are e , the value of the comprehensive energy consumption per unit product, in kgce/t; $P_{sub i}$, the physical output of the i -th grade of qualified vinyl acetate product (which is to meet the requirements of SH/T 1628.1-1996), in tonnes; M , the number of product grades.

6 Energy-saving management and measures

6.1.1 The enterprise assesses the energy consumption per unit product of vinyl acetate at regular intervals and establishes a system of responsibility for energy use.

6.1.2 The enterprise sets up an energy consumption statistics system as required, builds file records of energy consumption test data, energy consumption calculations and assessment results, and keeps those documents under control.

6.1.3 The enterprise equips itself with energy metering instruments according to the requirements of GB 17167 and establishes an energy metering management system.

6.2.1 Economical operation. General equipment used in production is to reach an economical operating state: the economical operation management of motors conforms to GB/T 12497, that of fans, pumps and air compressors to GB/T 13466, and that of power transformers to GB/T 13462. Maintenance management of the various pipe networks is to be strengthened.

6.2.2 Energy-saving technical measures. Their adoption is encouraged, for example: a) closed recovery of steam condensate; b) multiple-effect rectification; c) recovery of the steam energy of high-temperature materials in the production plant.

6.2.3.1 The enterprise raises the energy efficiency of general equipment in motor systems and replaces high energy consumption equipment with high-efficiency energy-saving equipment. For equipment running more than 3 000 h a year, motor efficiency is to reach the energy efficiency grade level of GB 18613; clean water centrifugal pumps the evaluating value of energy conservation of GB 19762; ventilation fans the energy efficiency grade level of GB 19761; displacement air compressors the energy efficiency grade level of GB 19153.

6.2.3.2 The enterprise raises the efficiency of transformation and distribution equipment, distribution transformers reaching the energy efficiency grade level of GB 20052.

6.2.3.3 The enterprise raises the efficiency of lighting systems; electric light sources and ballasts are to be chosen among products whose energy efficiency reaches the evaluating value of energy conservation of the relevant energy efficiency standards.

6.3 Supervision and assessment. The enterprise strengthens energy metering management, regulates its metering practice, supervises and inspects the metering instruments as prescribed, strengthens the assessment of energy consumption, reinforces energy-saving awareness, and carries out energy audits and energy efficiency benchmarking at regular intervals.