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

GB/T 12326-2008

Replacing GB 12326-2000

Power quality - Voltage fluctuation and flicker

电能质量 电压波动和闪变

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1 Scope

China's national standard for voltage fluctuation and flicker - the companion of GB/T 12325 and the one that deals with rapid variations rather than slow drift. It specifies the limits of voltage fluctuation and flicker and the methods of test, calculation and evaluation. Flicker is an unusual quantity to regulate because it is defined by human perception rather than by physics. A fluctuating voltage makes a lamp fluctuate in brightness, and the eye and brain are far more sensitive to that at some frequencies than at others - most sensitive around eight or nine changes a second, and much less so above and below. So the measurement is made through a filter that reproduces the response of the eye and the lamp, and the result is expressed as a flicker severity index, short term and long term, on a scale where unity is the threshold of irritation for the average observer. That is what is limited, and it is why the standard cannot simply set a percentage of voltage variation. What causes it is a small number of loads that draw large fluctuating currents: arc furnaces above all, along with welding plant, rolling mills, large motor starting and mine winders. The standard therefore sets not only the limits at the point of common coupling but the method by which the emission allowed to an individual customer is derived from them - because the network limit has to be shared out among everyone connected to it, and a customer installing an arc furnace has to know in advance what they will be permitted to emit and therefore what mitigation they will have to buy. Issued on 18 June 2008 and in force since 1 May 2009, it replaces GB 12326-2000.

This Standard specifies the limits and test, calculation and evaluation methods of voltage fluctuation and flicker. This Standard is applicable to the rapid change of the voltage of the common connection point caused by the fluctuating load under the normal operation mode of the AC 50Hz power system and the occasion where people may obviously feel the light

flicker.

2 Normative references

The following standards contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. For dated references, subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB/T 156-2007 Standard voltage (IEC 60038.2002, MOD)

GB 17625.2 Electromagnetic compatibility (EMC) - Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A (GB 17625.2-2007, IEC 61000-3-3.2005, IDT)

GB/Z 17625.3 Electromagnetic compatibility--Limits--Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 16A (GB/Z 17625.3-2000, idt IEC 61000-3- 5.1994)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 point of common coupling; PCC the connection of more than one user in an electrical system

3.2 fluctuating load the load of varying power periodically or un-periodically taken from the supply network during production (or operation); for example, steel-making electric arc furnace, rolling mill, arc welding machine

3.3 voltage fluctuation a series of changes or successive changes in R.M.S. (valid value)

3.4 R.M.S. voltage shape; $U(t)$ time function of periodic R.M.S. (valid value) per half fundamental wave voltage

3.9 long term severity; Plt calculated from the short-term flicker value Pst ; reflects the magnitude of the flicker for a long time (several hours) (see Annex A); the basic recording period for long-term flicker is 2 h

3.10 cumulative probability function; CPF the abscissa represents the measured value, and the ordinate represents the percentage of time over the corresponding abscissa value for the total measured time (see Figure 2)

4 Limits of voltage fluctuation

For the voltage fluctuation caused by point of common coupling in power system for any fluctuating load user, its limits are related to voltage change frequency and voltage level. For low voltage fluctuation frequency (e.g. $r \leq 1000$ times/h) or regular periodic voltage fluctuation, its voltage fluctuation frequency and voltage fluctuation value can be determined by the measurement of R.M.S. voltage shape $U(t)$. The limits of voltage fluctuation are shown in Table 1.

5 Limits of flicker

5.1 For point of common coupling of power system, in the smaller mode of normal operation of the system, taking a week (168

h) as the measurement cycle, all long-term flicker values Plt shall meet the requirements of Table 2 for flicker limits.

5.2 Usually, the flicker value caused by point of common coupling in power system alone of any fluctuating load user shall meet the following requirements.

5.2.4 The third level regulation. For the single fluctuating load user which does not comply with the regulations of the second level, if it still exceeds its flicker limits after treatment, it shall relax the limit appropriately, based on PCC point actual flicker conditions and development forecast of grid. However, the flicker value of PCC point must comply with the provisions of 5.1.

6 Measurement and estimation of voltage fluctuation

The voltage fluctuation can be described by R.M.S. voltage shape $U(t)$. The relative voltage change d and rate of occurrence of voltage changes r are indicators to measure the voltage fluctuation size and speed. The relative voltage change d can be defined as.

8 Superposition and transfer of flicker

8.1 The flicker and background flicker caused by n fluctuating loads are superimposed on the same node. Its short term severity can be calculated by the following formula.

8.2 The transfer of flicker on different bus bars in power system is shown as Figure