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

GB/T 311.4-2010

**Insulation co-ordination -- Part 4: Computational guide to
insulation co-ordination and modeling of electrical networks**

绝缘配合 第4部分：电网绝缘配合及其模拟的计算导则

(English Translation)

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Foreword

This section uses redrafted law revision using IEC 60071-4:2004 "insulation coordination - Part 4. insulation coordination and power grid simulation Calculation Guidelines "(in English).

This section drafted in accordance with the rules of GB/T 1.1-2009 and GB/T 20000.2-2009

given.

This part of IEC 60071-4:2004 and its main technical difference between the following reasons.

--- 3.17 lightning current representation by "lightning current maximum value" instead of "lightning current minimum." IEC 60071-4:2004 editorial mistake Mistake, it has been modified;

--- 7.6.3.3 inductive branch with "0.5 μ H/m" instead of "1 μ H/m". According to our experience, 1 μ H/m value is too large, so enter Were modified;

--- Deleted "7.4.3.1 recommend using PI model," the article title line. 7.4.3 because no 7.4.3.2, does not meet the GB/T 1.1-2009 of the relevant provisions. It made editorial changes;

--- Increase in 7.6.5.1.4 in "Note 2. 7.6.5.1.3 and 7.6.5.1.4 method is described for the standard atmospheric conditions, not test Consider the impact of height above sea level, it should not be directly applied to engineering... "Because of IEC 60071-4" 7.6.5.1.3 using standard area the air gap model "and" 7.6.5.1.4 indicates an air gap model based on the spread of the pilot "methods described are for standard in terms of quasi-atmospheric conditions, does not consider the impact of altitude, it can not be directly applied to engineering. It can raise will be described in order to improve Operability. Another original in 7.6.5.1.4 "note" extended to "Note 1."

--- Increasing the voltage level 500kV Transformer devices typically capacitance to ground data in Table 7.6.7 of the transformer 6. I have to adapt the actual needs of the country, improve the operability.

--- Breakers and disconnectors in 7.6.8 Table 7 to increase the voltage level 500kV circuit breakers and disconnectors type of equipment typical of Capacitance data. In order to adapt to the actual needs of our country, improve the operability.

--- 7.6.9 lightning

- Delete "that lightning statistics for the world is the same." Sentence. This remark is not strict, because of the different regions, different countries the probability distribution of lightning current amplitude are quite different.

- Add "Note. Please pay attention to ground flash density sensitivity should be monitored and lightning current amplitude consistent monitoring of sensitivity, otherwise it will bring error... "

--- 7.6.9.3 represents the first negative downward lightning probability distribution - Deleted "can also use some of the existing empirical formulas used in some countries." Line. NA therefore deleted.

- Add "Note. According to the actual measurement of data, mine calculated in most parts of

the lightning current amplitude distribution of mining with $\lg P(I_f) = -I_f/88$, other than the Southern Northwest, parts of Inner Mongolia Autonomous Region (average such areas Thunderstorm days generally lightning current amplitude 20 and below) less mine area is halved, $\lg P(I_f) = -I_f/44$ "because it is not.

The same area, the probability distribution of lightning current amplitude in different countries are quite different, and IEC 60071-4 "7.6.9.3 only mediator Introduce a simplified formula for distribution on a current amplitude IEEE raised, not fully applicable to our country, so add comments China's actual indicated to improve operability.

--- 10.1.3 with certainty Law "maximum lightning current" instead of "minimum lightning current." IEC 60071-4:2004 editorial error, so advance Were modified;

--- Increase in the data required in 10.2.2 "--- discharge characteristics of the tower head of the air gap; 'computing needs.

--- Continuous operation 12.3.1.4 Table 15 arrester characteristics with voltage U_c data "324kV" instead of "350kV", with exercise Data for impulse residual voltage $U(2kA)$ of "907kV" instead of operating impulse residual voltage $U(1kA)$ data "864kV". To accommodate the actual needs of our country, that is consistent with the relevant provisions of GB 11032.

--- Appendix A

- A.3 traveling wave method. often single-phase inductor lossless line with the formula " $V(x, t) = ZCI(x, t) = 2 \times ZCF1(x - \text{upsilont})$ " instead of " $V(t) = ZCI(t) = 2 \times ZCF1(x - \text{upsilont})$ ".

- A.4 single conductor line models with frequency dependent formula " $V1(t) = F-1(ZC) \times I1(t) = F-1(e^{-\gamma t}) \times (V2(t) = F-1(ZC) \times I2(t))$ " instead of " $V1(t) = F-1(ZC) \times I1(t) = F-1(e^{-\gamma t}) \times (V1(t) = F-1(ZC) \times I2(t))$ ".

- A.5.1 model parameters using the formula " $-dV(P, x) dx = Z(P) I(p, x)$; $-dI(P, x) dx = Y(P) V(p, x)$ " instead of " $-dV(P, x) dx = Z(P) I(p)$; $-dI(P, x) dx = Y(P) V(p)$ ".

IEC 60071-4:2004 editorial errors, it has been modified.

--- Portion of the IEC 60071-4:2004 clause above main difference has been involved in an empty space by the outside edge of the vertical page Straight single line (|) were marked.

This section of Appendix A, Appendix B, Appendix C, Appendix D, Appendix E, Appendix F for the informative appendix.

This part is proposed by the China Electrical Equipment Industrial Association.

This part of the National high-voltage test technique and insulation with Standardization Technical Committee (SAC/TC163) centralized.

1 Scope

GB/T 311 provisions of this part of the insulation with digital computing guidelines, and made generally accepted recommendations.

--- Digital model of the power system;

--- Applies in numerical deterministic and statistical methods.

This section applies to the calculation method given in insulation coordination, modeling and examples of relevant information, in order to adopt GB/T 311.2-2002 proposes a method, apparatus, or device and select 311.1-1997 insulation level according to GB .

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member; undated references, the latest edition (including any amendments) applies to this document.

GB 311.1-1997 insulation with high voltage power transmission equipment (neq IEC 60071-1:1993) GB/T 311.2-2002 Insulation coordination - Part 2. insulated high voltage transmission and distribution equipment used in conjunction with Guideline (eqv IEC 60071-2:1996) GB/T 311.3 Insulation Coordination Part 3. HVDC converter station insulation coordination procedures (GB/T 311.3-2007, IEC 60071-5:2002, MOD) GB 1984 high voltage AC circuit breaker (GB 1984-2003, IEC 62271-100:2001, MOD) GB 11032 metal oxide surge arresters without gaps (GB 11032-2000, eqv IEC 60099-4:1991) GB/T 13499 power transformer application guide (GB/T 13499-2002, idt IEC 60076-8:1997) GB/T 16927.1 High-voltage test techniques Part 1. General test requirements (GB/T 16927.1-1997, eqv IEC 60060-1:1989) IEC 62271-110:2005 high-voltage switchgear and control equipment - Part 110. Inductive load opening and closing (High-voltage switchgear and control gear - Part 110. Inductive load switching)

3 Terms and Definitions

GB 311.1-1997 In addition, the following terms and definitions apply to this document.

Note: Certain terms from IEC multilingual dictionary [1] 1.

1 square brackets references see Ref.

Feedback backfeeding Powered by low voltage through the transformer high-voltage overhead lines or cable lateral working conditions.