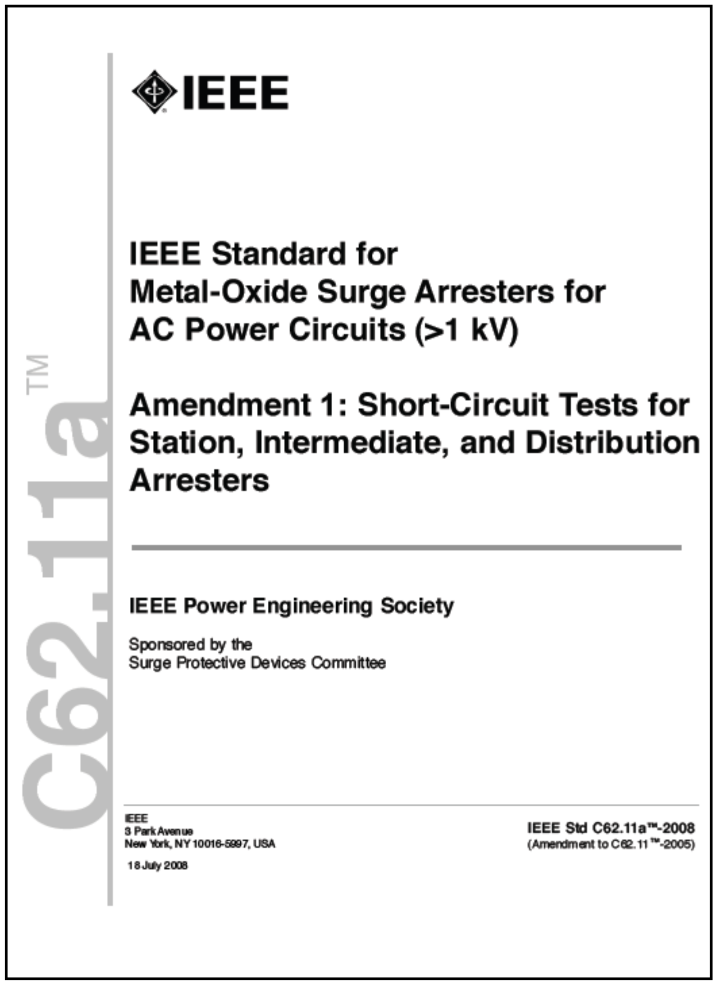
Quick Overview of IEEE C62.11a

IEEE Short-Circuit Test Requirements

Last month the IEEE standards department published C62.11a, an amendment to C62.11. This new amendment now specifies a short circuit test for all arresters. What makes this amendment so unique is that it is virtually identical to the test procedure published in IEC 60099-4 in 2006. This similarity was purposeful and carefully orchestrated by common participants on both committees. This is a first for arrester standards harmonization. Though it will be many years before both standards are in complete harmony, this is a first step.

Changes in Test Requirements with this amendment are:


C62.11a™

IEEE

IEEE Standard for
Metal-Oxide Surge Arresters for
AC Power Circuits (>1 kV)

Amendment 1: Short-Circuit Tests for Station, Intermediate, and Distribution Arresters

IEEE Power Engineering Society

Sponsored by the
Surge Protective Devices Committee

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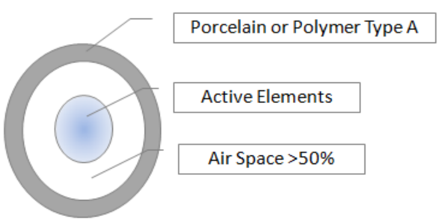
IEEE Std C62.11a™-2008
(Amendment to C62.11™-2005)

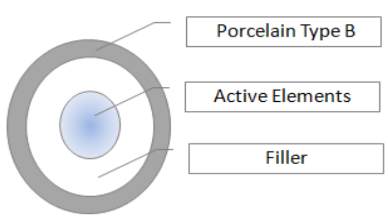
1. For the first time in C62.11, there is a specific procedure for polymer housed station arresters. Furthermore, the onerous requirement for a 2.5pu asymmetrical current peak is not required unless the polymer arrester is design type A. (More below)

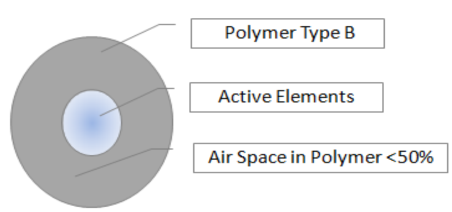
2. With respect to short circuit testing, arresters are now divided into several types and each design has different short-circuit test criteria.

   Design A: Arresters with a gas channel running along the entire length of the unit and fills ≥ 50 % of the internal volume not occupied by the internal active parts.



   Design B: Arresters of a solid design with no enclosed volume of gas or internal gas volume filling < 50 % of the internal volume not occupied by the internal active parts.



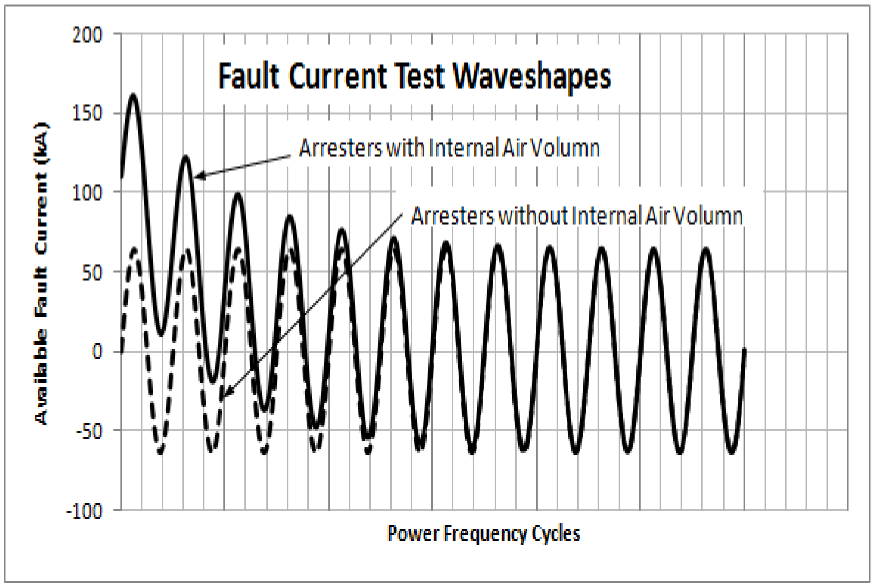


3. Two intermediate currents have been added to the requirement of type A arresters. This was due to field failure experience of some porcelain arresters that could not be explained with excessive high current.

4. Pre-failing of the arrester prior to the application of short circuit is now clearly defined. A fuse wire can be used for Type A and Porcelain Type B, but not for Polymer Type B.

An Informed Decision

For the past 25 years, manufacturers and high current test labs have labored hard to run pressure relief test on polymer housed arresters as prescribed for porcelain arresters. The issue hasbeen attaining an adequate asymmetrical fault current. Due to the nature of polymer housed arresters, they develop higher arcing voltage than of a porcelain arrester of similar ratings. This higher arcing voltage makes attaining the required asymmetrical peak current nearly impossible.



Kema Labs in conjunction with ABB ran tests in 2003 that focused on finding a more suitable test method that was more realistic and attainable in the high current test labs worldwide. At the end of several days of testing, they were able to conclude the following and write a paper[1] for presentation at a CIGRE session.

1. The energy injection into a polymer housed arrester is higher for a symmetrical current wave.
2. There is no reason to believe that high peak current is the most onerous situation in terms of thermal stress since the arc has already reached the outside of the arrester by the time peak current is reached.
3. It is doubtful that the onset of fault current will be a voltage zero as is implied in the 2.5 offset requirements.

Based on the above test and conclusion, the IEC modified the test requirements to exclude the need for the 2.5 asymmetrical current for polymer house type B2 designs.

Next up in harmonization of the IEC and IEEE arrester standards will come in the specification of an Energy Rating Test. Stay tuned…..

Jonathan Woodworth
12-9-08

[1] R.P.P. Smeets, H. Barts, W.A. van der Linden, L. Stenstrom, Modern ZnO Surge Arresters Under Short-Circuit Current Stresses: Test Experiences and Critical Review of the IEC Standard CIGRE 2004 Session, Report A3-105