IEC-IEEE Task Force Meeting on Impulse Tests Procedure

A Comparison of Procedure **B** and Procedure **C**

Paris, France 2004-11-29

Procedure B versus Procedure C

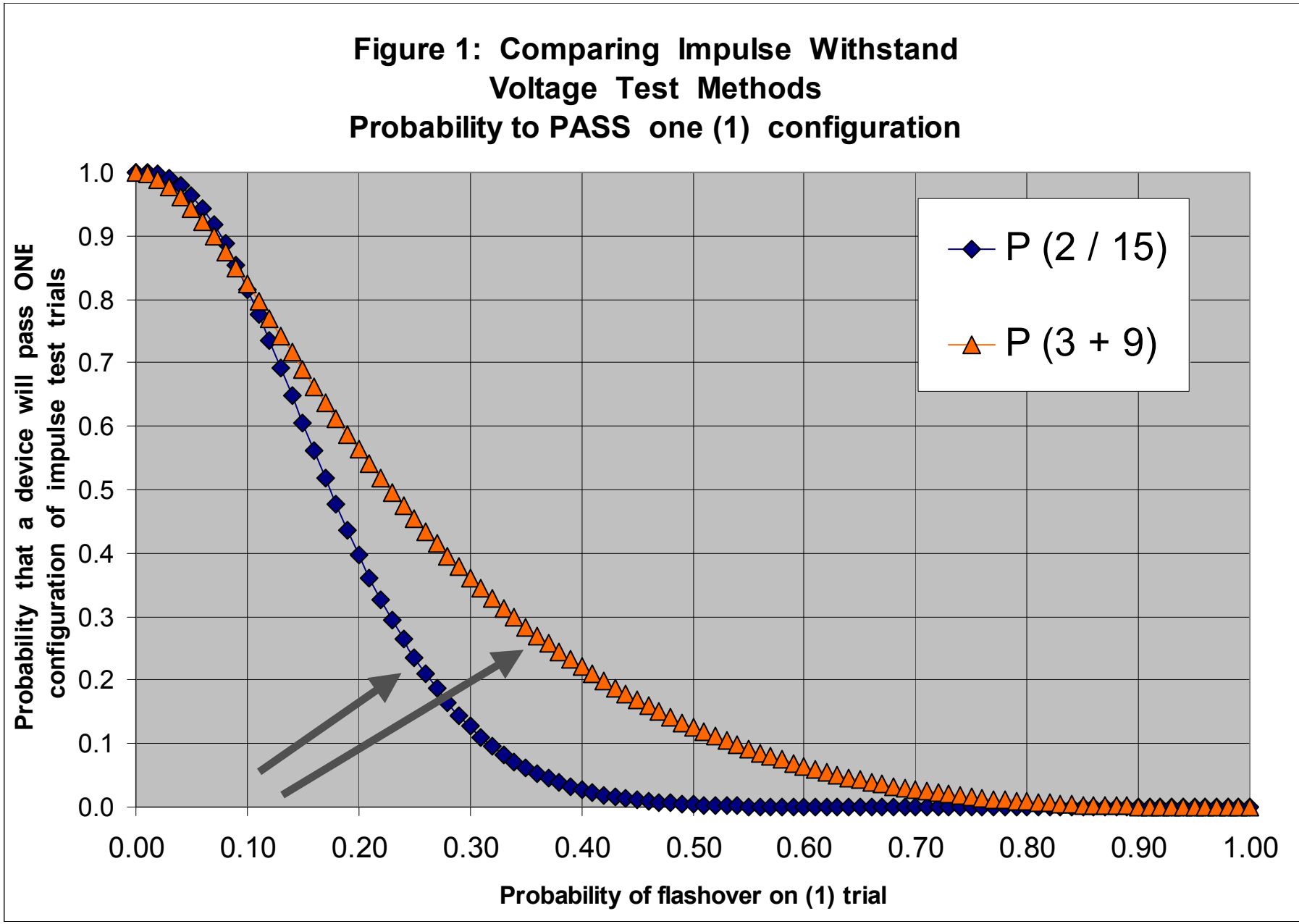
- Assumption: Both users and manufacturers w what is best for all electricity users
- Type-tests for new equipment designs
- Routine tests in the factory
- Tests after delivery and installation (commissionin
- Focus on the Impulse Withstand Voltage Type-tes

Procedure B versus Procedure C

- Unlike short-circuit tests or temperature-rise tests, imp withstand voltage tests are not “deterministic”, “statistical” in nature, and therefore require a diffe approach, such as Procedure B or Procedure C.
- Through the following series of figures comparing Proce B, or the “2 / 15” test method with Procedure C, or the “3 test method, we hope to see some reasons why experience with the so-called “3+9” method has been successful in North American applications.

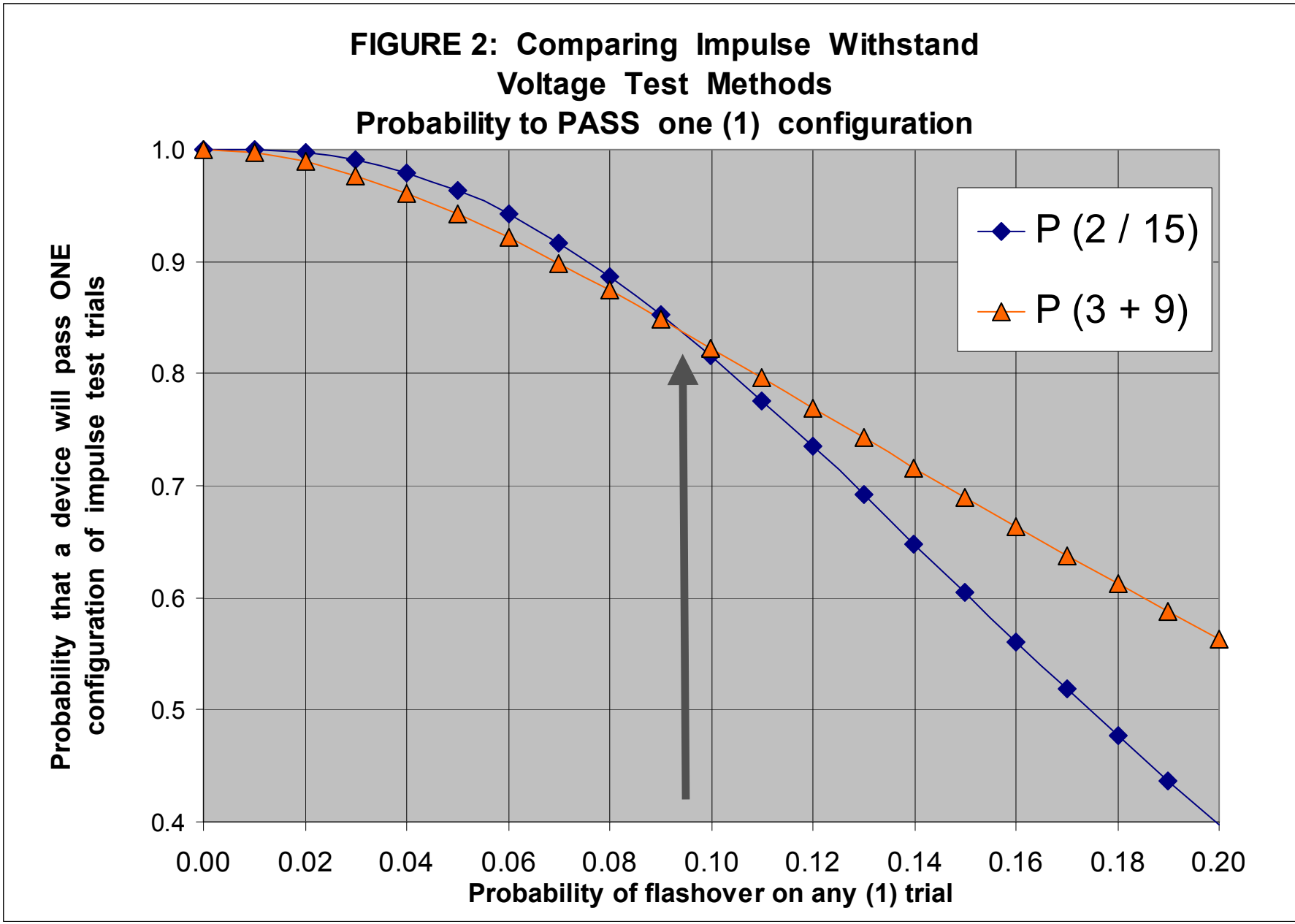
Procedure B versus Procedure C

Figure 1: Trials for One Test Configurati



Procedure B versus Procedure C

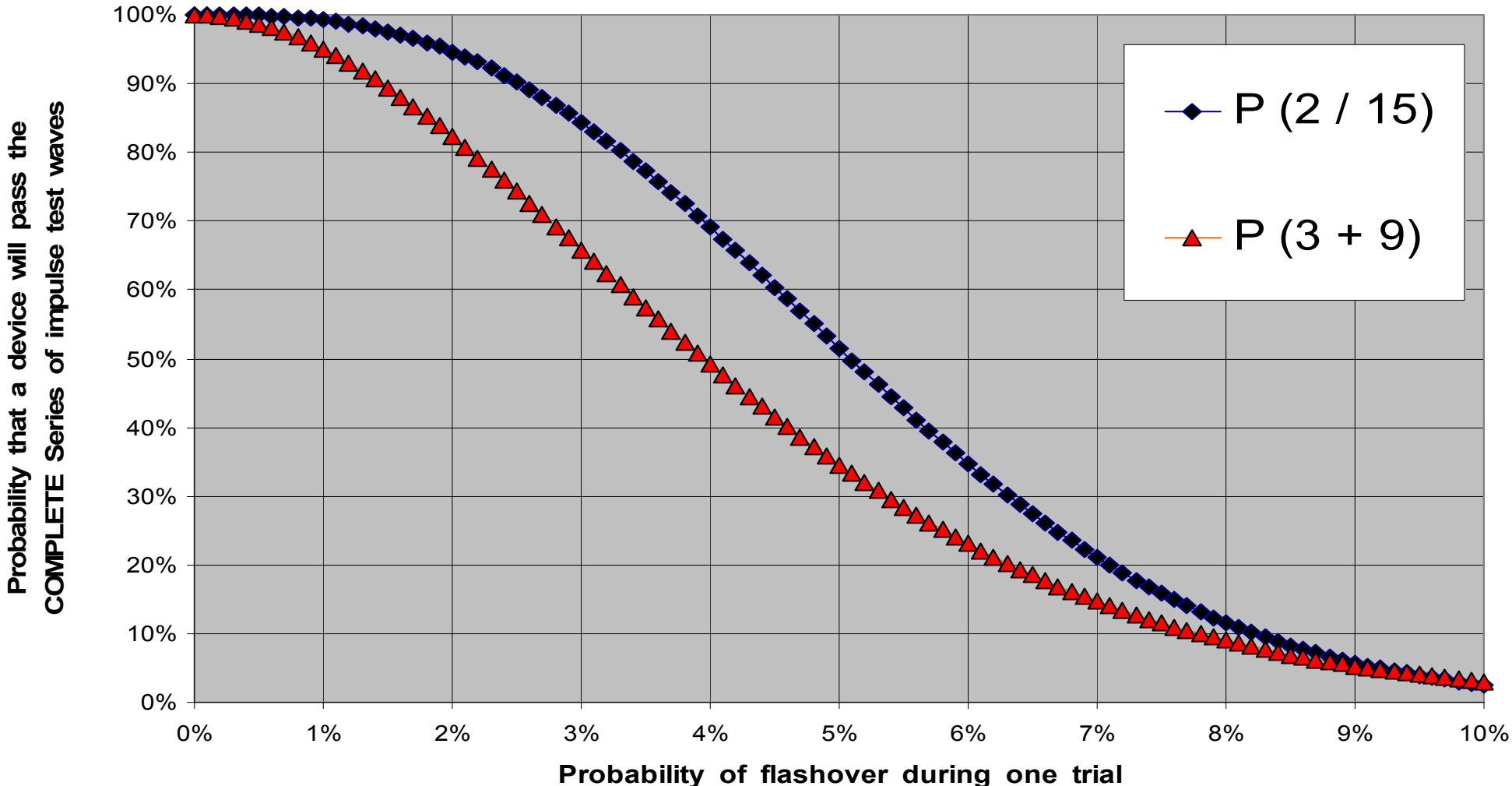
Figure 2: Trials for One Test Configurati



Procedure B versus Procedure C

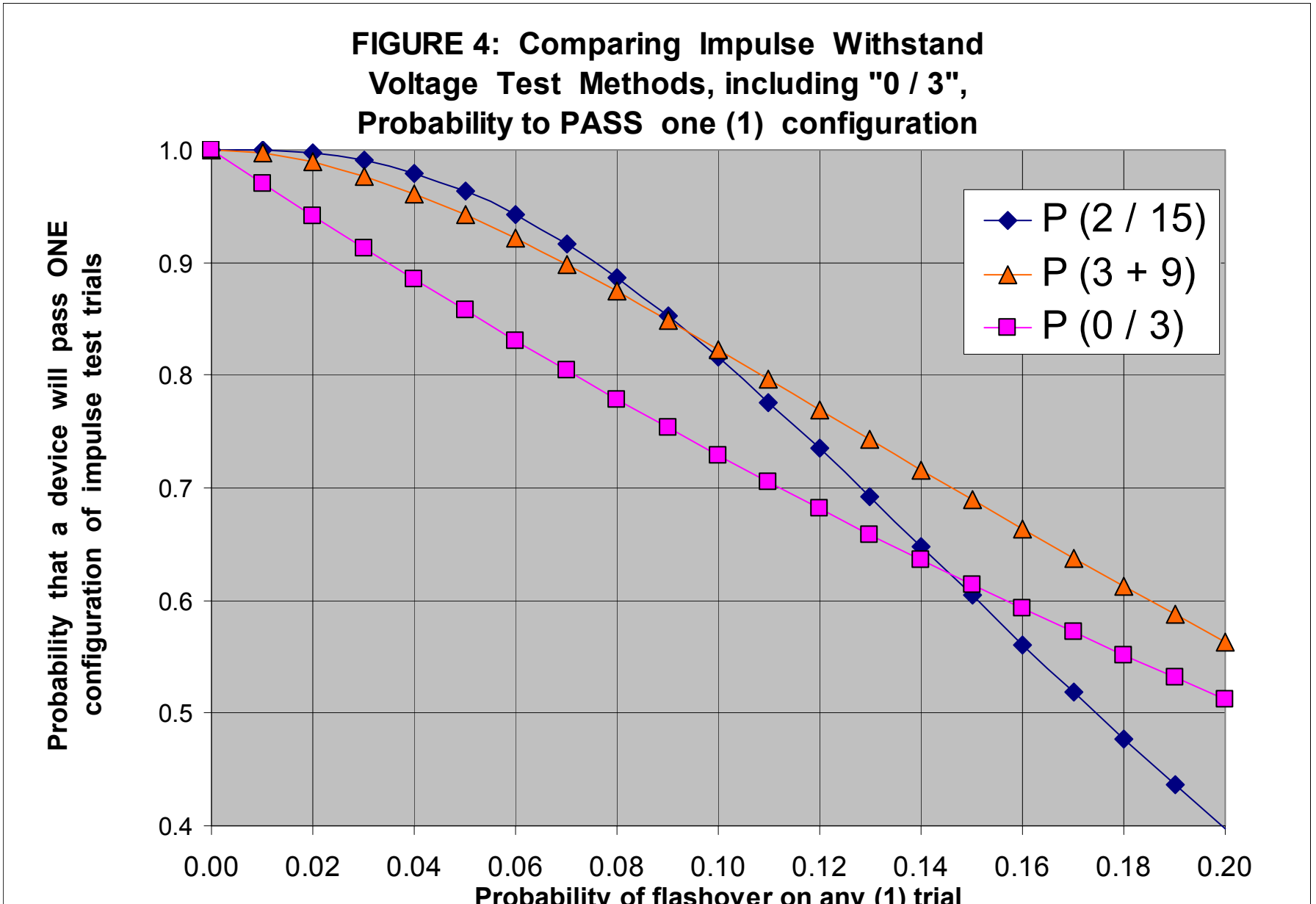
Figure 3 The Complete Series of Trials

FIGURE 3 - Cumulative Probability that a device will pass a COMPLETE series of 18 sets of trials, including 9 Configurations, and both "+" and "-" polarity impulse test waves



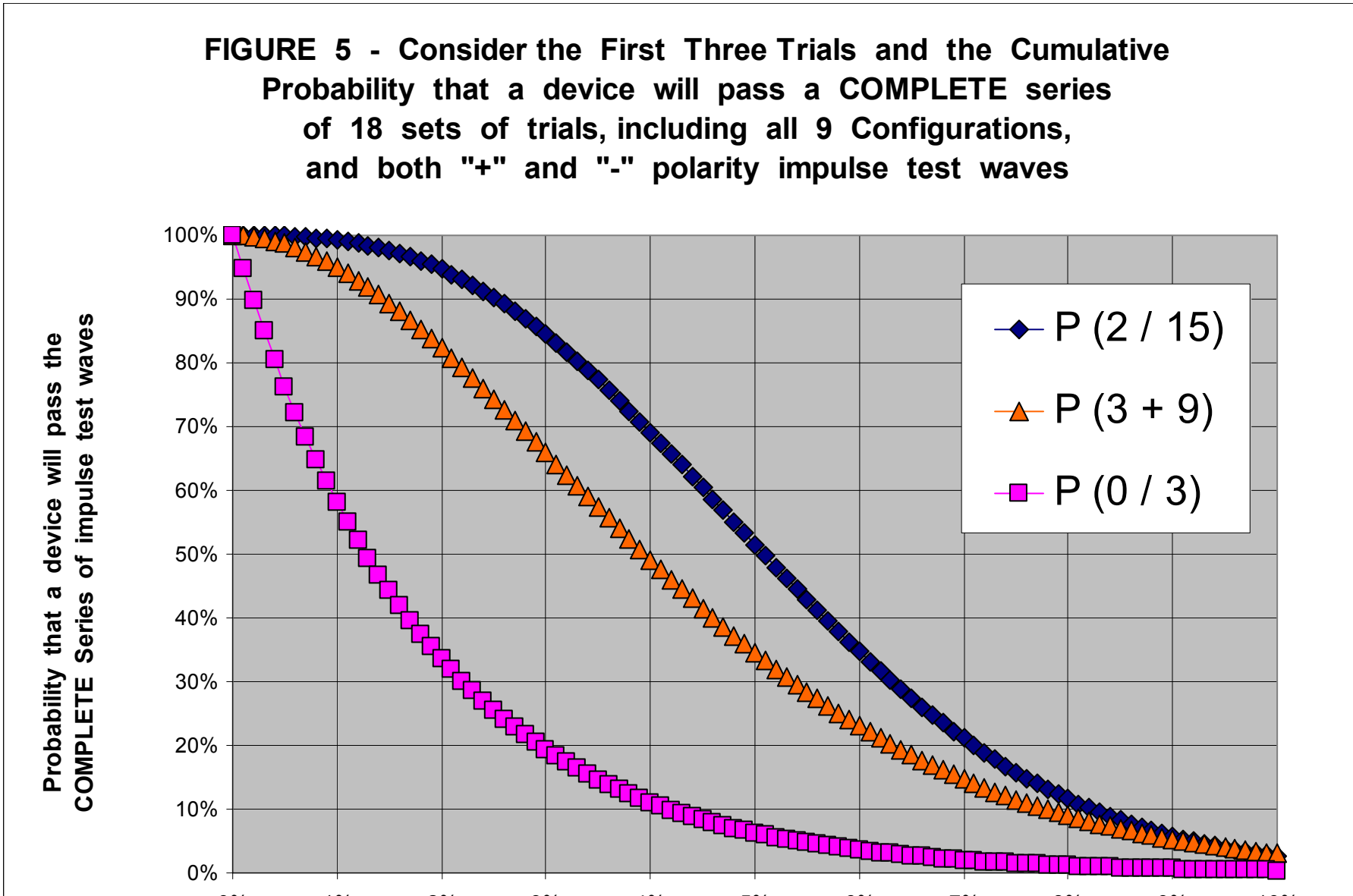
Procedure B versus Procedure C

Figure 4 The First Three Trials



Procedure B versus Procedure C

Figure 5 The First Three Trials and the Complete Series of all Configurations



Procedure B versus Procedure C

- Conclusions:
  - At first Figure 1 seems to show the “2 / 15” metho more discriminating over all.
  - However, Figure 2 shows that there is a region where “3 + 9” method is more discriminating.
  - Figure 3 shows that this is really important when the impulse withstand test series is considered. In fact in region where the probability of failure is low, the “3 method appears to have an advantage.

Procedure B versus Procedure C

- Conclusions:
  - Furthermore, Figure 3 also shows that when cumulative probability of the complete series of imp trials is considered, both methods are very good detecting a device with unacceptable performance.
  - Figure 4 shows that the “0 / 3” first part of the “3 method can be very effective. In my opinion, the re it has been effective is that no additional flashovers allowed, not one.
  - Test engineers will tell you that in many cases, the trials in the series are the more likely to cause a flash

Procedure B versus Procedure C

- Conclusions:
  - Figure 5 shows that in order to have a better than chance of passing a complete series of impulse withs tests by performing the first three trials, “0 / 3”, in a configurations, a device would have to have a proba of flashover during a single trial of less than 1.3%.
  - Margins are built into the insulation coordina procedures.
  - Both the “2 / 15” method (Procedure B) and the “3 method(Procedure C) remain a effective ways of pro the rated impulse withstand voltage of a device.
  - It would be a mistake to remove Procedure C. It sh

Procedure B versus Procedure C

Conclusions:

I believe it would be a mistake to remove Procedure

Procedure C should remain an acceptable impulse withstand voltage test procedure in 62271-1 and also in 62271-100 and 62271-20