

## **SUGGESTION TO IEC: Service to clarify DOUBTS on THE INTERPRETATION OF TESTING REQUIREMENTS** (with real examples for IEC 62271-200 & IEC TR 61641)

This is part of my LinkedIn posts “ POINTS that TESTING LABS COULD EXPLAIN to their clients IN THE TESTS QUOTATION”

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### **1) INTERPRETATION PROBLEMS DURING TESTING IN LABS : about the suggestion**

My motivation for writing this article and suggestion to the IEC came after I saw, very recently, one of my clients invest high in short circuit and internal arc tests and, even with a well-designed equipment, run into problems. The cause was that the laboratory's interpretation of what is written in the standards is totally unrealistic. I have witnessed this several times and it happens mainly where there are no other alternatives for testing in the region and / or the testing teams are small and outdated. Sometimes it is better to spend a little more to go to a testing lab further away. Nowadays, I suggest my clients to use laboratories linked to associations that follow uniform testing procedures.

One of the good ones is the STL - Short Circuit Testing Liason.

IEC technical standards provide requirements for high power testing that can sometimes lead to different interpretations by the testing labs and the user who pays for the test. Most of the time, common sense prevails, and the doubt is clarified at the moment of the test. However, when a dubious interpretation occurs, leading the laboratory to claim that the equipment did not pass the test, but the user has another opinion, there is no – fast - higher instance to ask. I worked 25 years in testing labs and in those times it was a practice to train the team in other distant laboratories. This helped to maintain the team updated. Today, teams are very small and most of the labs do not invest in training.

The fact is that the level of understanding of the concepts behind the lines of the standards has dropped a lot. And, in some cases, the texts are written without considering that much less prepared people will read.

It is useful and fair - from the point of view of those who purchased the standard - that the IEC has a formal channel where it is possible to solve interpretation conflicts. When IEC receives a query, it usually pass it on to the WG experts that prepared the standard. In general, the doubt is answered in the possible timing. . The timing is not a key issue. The important thing is to know that if needed IEC will give an opinion about the doubt. It would be easy to create and to manage a “network of voluntary experts” to answer the questions of the specific matters in , let’s say, 15 days. This could start , for example, with the documents of TC 17 (switchgear /controlgear) and TC 32 (fuses)..

It would be a great advance if the “FOREWORD OF IEC STANDARDS” started to contain a sentence like: “IEC cannot be held responsible for the way in which the documents are used or for any misinterpretation by any end user. in case of major doubts about interpretation of testing methods, the IEC will try to clarify them with the help of the experts who prepared the texts and others”.

So, the suggestion to IEC is to implement the “ doubts service” and to revise the FOREWORD to include the sentence just above and make it known to users.

## 2) SOME EXAMPLES OF DOUBTS, FROM REAL SITUATIONS I WITNESSED.

Here are some typical doubts. Some of them are taking place now and, any comments from the IEC or anyone who has been through the same situation are most welcome.

### a) “INTERNAL ARC TEST” IN MV SWITCHGEAR (IEC 62271-200) – INDICATORS WERE BURNED BY HOT GASSES (not permitted) OR BY GLOWING PARTICLES (permitted)

The criterion 4 – non-inflammation of the indicators due to the effect of hot gases - shall be attended to state that the performance is “satisfactory”. Sometimes, when some few indicators burn it is very difficult to distinguish if the burning of the indicators was caused by the glowing particles and not by the hot gases.

In IEC standard is specified that “The indicators should not ignite due to the effect of hot gases. If they start to burn during the test, the evaluation criteria can be considered satisfactory if proof is established of the fact that the ignition was caused by the glowing particles and not the hot gases. Photographs taken by high-speed cameras, video or any other appropriate medium can be used by the testing laboratory to establish evidence.”

**THE DOUBT:** The lab understands that the causes of burning 3 of the dozens of indicators (no photo to enable counting) were the hot gasses but do not present any evidence like a movie with a high-speed camera. You do, with your cell phone, a movie that – in your point of view - tell you that the cause were the glowing particles, which would mean “Satisfactory” .

The test laboratory state in the Test Report “Not satisfactory” for Criteria 4 but do not write it in the report nothing more than this. No evidence and no justificative. Not even a justificative like “It was not possible to identify if was caused by hot gasses (“Not satisfactory”) or by glowing particles (“Satisfactory)

### b) SHOR TIME WITHSTAND CURRENT & PEAK WITHSTAND CURRENTS TESTS BY IEC 62271-200 WITH OPEN DOORS

The concept of the standard is to carry out the tests under normal use conditions. In normal use the doors are obviously closed. However, the test laboratory do the tests with the doors completely open. The equipment attended the standard conditions and the lab stated “Approved”.

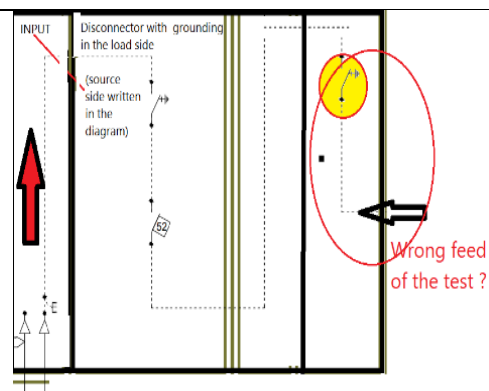
**THE DOUBT:** Is it reasonable to do a test with doors open where the objective is to check electromechanical aspects of forces ?\_The equipment will be in a in a weaker condition due to the open doors.

### c) SHOR TIME WITHSTAND CURRENT AND PEAK WITHSTAND CURRENTS TESTS BY IEC 62271-200 FED FROM LOAD SIDE INSTEAD OF SOURCE SIDE

The concept of the standard is to carry out the tests under normal use conditions.

The diagram of the panel clearly states the source side and the load side. First issue is that the testing lab mount everything to do the tests fed from the load side.

The lab do a first test in this situation that damage the grounding side, not designed for this situation.



After a discussion the test lab change the feed of test to the correct position and re-do the tests. Now the tests are performed as required by the client. It is approved . In the test report the testing lab include a note saying, “At the customer’s request, the application was not performed on disconnector, in its open and grounded position”. This note induce future readers / buyers to suppose that something different from the standard requirements was done.

**DOUBT:** Can the laboratory write this unnecessary note, from the point of view of IEC 62271-200 ?. What is the purpose of the note ?

d) **“INTERNAL ARC TEST”** IN MV SWITCHGEAR (IEC 62271-200) – **DISTANCE FROM TOP OF PANEL TO CEILING**

This point refers to the annex “Internal failure – Method for testing ... under arcing conditions due to an internal failure” . Reading ( \*\* ) about the importance of the distance from the top of the panel to the simulated ceiling we understand that it is necessary to include in the report a figure with the value used in the test and the reason for the chosen distance.

**DOUBT:** Is it requested that the testing laboratory indicate clearly the distance used in the test ? Should the lab include photo of the complete set and simulation of the room, which even allows estimating distances. As the heights of the control rooms are usually of the order of 3 meters and the panel has a height of 1.8 m, it would be reasonable for the laboratory to suggest that the test be carried out with 1.8 m (lower risk of burning indicators) instead of 0, 6 meters (higher risk of burning indicators) ?

( \*\* ) This distance is the biggest cause of indicator burns, due to the reflection of hot gases on the ceiling ( Ref: section 5.2 of the Brochure Cigrè 602/2014 ). The greater the distance from the ceiling, the lesser the possibility of burning indicators, which simulate the skin of nearby people (Ref: table 6 of IEC TR 62271-307)

e) **“INTERNAL ARC TEST”** in a LV switchgear by IEC TR 61641.- **NUMBER OF SHOTS**

The internal arc test is not a type test of IEC 61439 series. It is an optional test. If you wish to do the test by some reason, you use IEC TR 61641. The client of the laboratory wishes to do only two shots, but the testing lab insist that to have, in the test report, the statement “Approved” you need to do 5 or 6 shots in several positions listed in the IEC document only as examples. A 5 shots test is much more expensive than a 2 shots test.

**DOUBT:** Is the testing laboratory correct to do the request for a more expensive test??

**3) PLEASE HELP ME WITH ANSWERS:**

Some of these issues are taking place now and, any comments from the IEC experts or anyone who has been through the same situation is most welcome. As there are 19,500+ followers here and the majority are manufacturers, test labs, certifiers, designers, and utilities, I hope some of them have gone through these and can help.

If you can help me but cannot answer here, please write to my private email [sergiofeitozacosta@gmail.com](mailto:sergiofeitozacosta@gmail.com). Your answer will not be shared.

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The author of this article is Eng. Sergio Feitoza Costa. Sergio is an electrical engineer, M.Sc. in power systems and director of COGNITOR. It has 40+ years of experience in the design, operation and management of high power, high voltage, and other testing laboratories. After leaving CEPEL's testing labs, Sergio gained considerable experience using test simulations to support manufacturers and certification companies in substation equipment projects. He is co-author of several IEC and ABNT standards. Sergio is the author of SwitchgearDesign simulation software and DECIDIX.

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