Ensure the safety of your employees, infrastructure and security of supply!

Introduction

Customers are increasingly concerned with operator safety, reliability and security of supply. The introduction of the IEC 62271-200 standard provided customers with a standard for switchgear to achieve these goals. New concepts for safety, interlocking, loss of service continuity and better classification of internal arc compliance were introduced.

Did you know that to fully comply not only must the enclosure comply but the all internal components also need to comply to their own specific standards.

The following mandatory tests are required

a) tests to verify the insulation level of the equipment
b) tests to prove the temperature rise of any part of the equipment and measurement of the resistance of circuits
c) tests to prove the capability of the main and earthing circuits to be subjected to the rated peak and the rated short-time withstand currents
d) tests to prove the making and breaking capacity of the included switching devices
e) tests to prove the satisfactory operation of the included switching devices and removable parts
f) tests to verify the IP protection code
g) tests to verify auxiliary and control circuits
l) tests to assess the effects of arcing due to an internal arc fault (for switchgear and controlgear classification IAC)

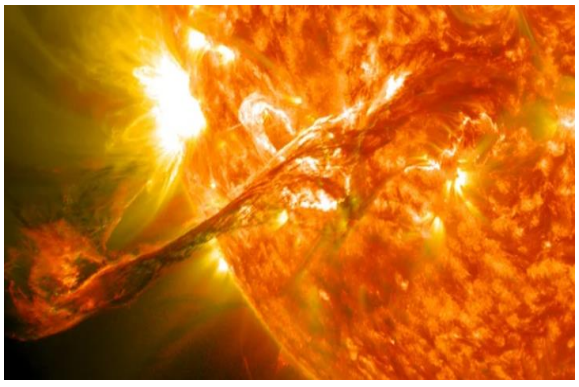
TGOOD responded with TAP17 to meet these requirements in compliance with the standard

To demystify the requirements, we will take a brief look at the importance internal arc requirement and the need for compliance of the internal components.

What is an internal arc fault and how does TGOOD ensure compliance?

An internal arc…

- is the result of a rapid release of energy in the event of an internal fault
- is created when the fault current passes through a dielectric, usually air
- dissipates maximum peak power
- has a temperature 5 x the surface temperature of the sun
- has a light intensity more than 2000 x normal office lighting
- causes volumetric expansion of approximately 40,000 x



Arc faults are usually caused by external factors, where the occurrence of an arc can never be totally prevented or predicted. Typically arc faults occur when:

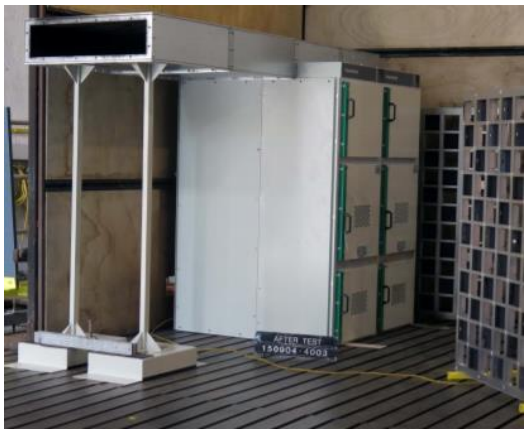
- there is an ingress of foreign material, i.e. water, insects or rodents
- mislaid materials, tools, loose wires, test connections
- faulty insulation or derogation of insulation
- over voltages, lightning or switching surges
- inappropriate operation, faulty interlocks, or disregard for operating procedures

Any one of the above can trigger an internal arc. Once the arc is ignited an explosion occurs which is released into building within 20ms. The arc continues to burn and expel plasma (high temperature ionised air and molten metals) from the switchgear until interrupted by an upstream circuit breaker.

To achieve compliance manufacturers must pass following five criteria:

- Correctly secured doors and covers do not open. Deformations are accepted, provided that no part comes as far as the position of the indicators or the walls on each side.
- No fragmentation of the enclosure occurs within the time specified for the test. Projections of small parts, up to an individual mass of 60g, are accepted
- Arcing does not cause holes in the accessible sides up to a height of 2m.
- Indicators do not ignite due to the effect of hot gases. Should they start to burn during the test, the assessment criterion may be regarded as having been met, if proof is established of the fact that the ignition was caused by glowing particles rather than hot gases. Pictures taken by high-speed cameras, video or any other suitable means can be used by the test laboratory to establish evidence. Indicators ignited as a result of paint or stickers burning are also excluded.
- The enclosure remains connected to its earthing point. Visual inspection is generally sufficient to assess compliance.

The test is carried out on all compartments of the switchgear, with indicators placed at the specified distance from the enclosure. A short circuit is created within the switchgear; the short circuit current is then injected for the duration of the test.



TAP17 switchgear meets the requirements for an internal arc classification of AFLR 31.5kA/ 1 second

Do I need to test if I use the appropriate PPE?

Personal protective equipment (PPE), serves to eliminate or reduce the effects of burning caused by the arc plasma in the event of an internal arc.

NFPA 70E is a standard that pertains to the selection and use of protective clothing. The selection of personnel protective equipment should be determined by the potential hazard and the parts of the body that could be exposed to the hazard.

PPE in not mandatory to ensure compliance to the IEC 62271-200 standard, however PPE at an appropriate and practical level is recommended. Keep in mind that PPE should be the last line of defence in the protection of personnel from injury and does not provide full protection against the effects of an internal arc. The first line of defence is ensuring compliance to the standard.

Do I need certification if I operate the switchgear remotely?

It is a common belief that providing remote closing and opening of circuit breakers together with motorised racking systems should make the switchgear safe to operate, but this is not necessarily true. A fault can occur at any time and not only during switching operations. Furthermore the use of remote racking devices necessitates monitoring and feedback confirmation that the system has functioned correctly. Although remote racking sounds like a viable solution experience has shown that remote operation of switchgear can be problematic, i.e. jammed mechanisms that go undetected resulting in dangerous operating sequences that can result in injury or equipment damage.

We have robust operating procedures, why do we need internal arc compliant switchgear?

TGOOD 10 DISCIPLINES OF SAFETY

Operating, work procedures, disciplines and work controls are commonly used to control work flows within safe boundaries. All work environments utilise some degree of operating procedures, practises and access control. In extreme cases some procedures may forbid operation equipment altogether. In practices, however, restrictive procedures are difficult to implement and maintain. Often the procedure will not suit the circumstance and will need to de discarded. It would therefore,

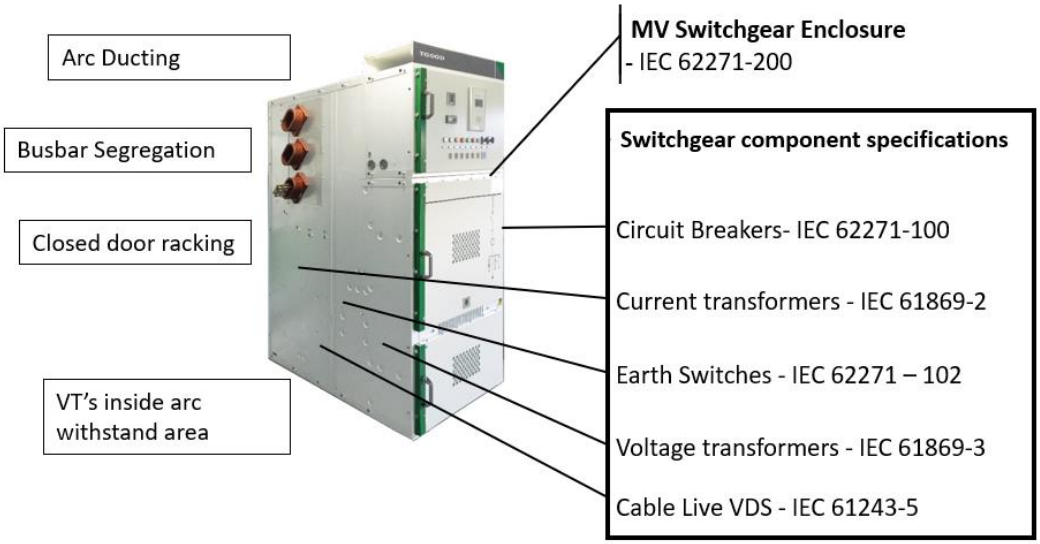
make sense that all new equipment should be safe with reliable operation to avoid restrictive procedures.

TAP17 switchgear, minimises the need for extensive PPE, special operating procedures and remote operations can be minimised or eliminated.

What about the components used inside the switchgear?

Certification of the components used in TAP17 is of utmost importance. There is a common misconception that if switchgear is certified to IEC62271-200 then all the components used therein comply, however this may not be true for all manufacturers.

Sub standard components inside the switchgear are suspectable to failure over time. A common problem is that of partial discharges. Small imperfections within the solid insulation go undetected through the initial production and commissioning phases. However the imperfections deteriorate over time and within a few short years internal faults develop. Often users believe this is caused by poor maintenance, but on deeper investigation the may the defects can be traced back all the way to non-certification



TGOOD ensures certification of individual components as well as certification of the switchgear enclosure.

Conclusion

The IEC 62271-200 standard provides a clear definition of the requirements. Users who specify this standard, and enforce compliance, believe that they have covered all the requirements and are often surprised when the switchgear fails unexpectedly. For ultimate

peace of mind users need to check the switchgear enclosure compliance as well as the compliance of medium voltage components used within the switchgear.

> ***TGOOD can provide peace of mind, cost effective switchgear and fast delivery times.***

TGOOD

31D Lake Road

Longmeadow North business etate

Modderfontein

+2710 010 5706 (Office)

www.tgood.com