How to perform a pre-qualification test - Interpretation of the standard

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With the first edition of IEC 62067 in 2001 the pre-qualification test (PQ Test) was introduced in the cable standards of IEC. The background for including this new test is given in this first edition of IEC 62067: “in order to gain some indication of the long term reliability of a cable system, it is necessary to carry out a long term accelerated ageing test. This test […] is to be performed on the complete system comprising the cable, joints and terminations in order to demonstrate the performance of the system.”

The test subjects cable systems consisting of highly stressed cable designs and their accessories to heating cycles under voltage. The cable system is usually installed under various laying conditions. During this test the cable system has to endure various environmental conditions which may vary, e.g. summer, winter, dry, wet, etc. The pre-qualification test requires the voltage to be applied during one year. During this year the cable system installed must be subjected to 180 heating cycles each with a minimum duration of 24 hours. This leaves quite some room for interpretations and consequently different ways to execute this test, resulting in different outcome depending on the choices made at the start of the test.

One could choose to apply 48 hour heating cycles. This results in a nice distribution of all heating cycles during the one year voltage application. However, this is not corresponding to the actual situation where the load has a 24 hour pattern. When choosing to apply 24 hour heating cycles, should the heating cycles be applied during the whole year of voltage application, i.e. 365 heating cycles, or is it allowed to stop after 180 heating cycles have been applied? If only 180 heating cycles are applied, should the heating cycles take place during the first half year of the test or should it be distributed following the seasons? Next to this, during the heating of the cable system, the conductor temperature should reach 90-95°C. Different laying conditions result in different thermal environments and consequently different conductor temperatures with the same conductor current and obviously, this must be accepted. But what (sheath) temperature difference between the various laying conditions is acceptable? This lack of guidance in the standard results in different ways this important test is being executed at the various test places, either at the manufacturer or at independent laboratories world-wide.

KEMA Laboratories have performed this test since the first edition of IEC 62067 at their test facility in Arnhem, the Netherlands, and have witnessed this test at various manufacturers and test facilities world-wide. This showed us that many different interpretations exist as illustrated above. Based on our experience, this paper will give a guideline to execute this pre-qualification test in accordance with the requirements given in the standard and in line with the background for including this test in the standard. This will avoid the current situation where the result depends on the choices made before starting the test.