CERTIFIED
TEST REPORT

SDOH

Programmable Delay

Faulted Circuit Indicator

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February 5, 2015

CERTIFICATION

Statements made and data shown are, to the best of our knowledge and belief, correct and within the usual limits of commercial testing practice.

Bruce Hoeppner	Alan Yerges	Doug Yute
Lead Design Engineer	*Sr. Engineering Manager*	*Director of Engineering*
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date	date	date

INTRODUCTION

A faulted circuit indicator is a device which indicates the passage of fault current and aids in the location of a cable fault.

The SDOH Programmable Delay Faulted Circuit Indicator trips on fault current of an established level followed by loss of power and resets after a time delay programmed by the user or on manual reset. The SDOH is designed to mount easily on an unshielded conductor with the use of a hot stick. This test report certifies that the SDOH was successfully tested to Eaton's Cooper Power Systems - Components and Protective Equipment FCI standards and applicable sections of ANSI/IEEE Standard 495-2007, "Guide for Testing Faulted Circuit Indicators."

QUALIFICATION TESTS

OBJECT

To demonstrate that the Eaton's Cooper Power Systems SDOH Programmable Delay Faulted Circuit Indicator (SDOH) meets all of the necessary performance requirements as outlined in ANSI/IEEE STD. 495-2007.

PROCEDURE

The following design tests were performed on SDOH units, representative of normal production, to demonstrate that the SDOH meets all of the necessary performance requirements.

DESIGN TESTS - ANSI/IEEE STD. 495-2007

A1. Temperature Cycling Test ..... Section 4.4.1
A2. Water Submersion Test ..... Section 4.4.2
A3. Outdoor Weathering ..... Section 4.4.3
A4. Salt Spray Test ..... Section 4.4.4
A5. Electric Cord Pull Out ..... Section 4.4.5
A6. Impact Resistance Test ..... Section 4.4.6
A7. Short Time Current Test ..... Section 4.4.7
A8. Adjacent Conductor Test ..... Section 4.4.8
A9. Trip Current Test ..... Section 4.4.9
A10. Reset Test ..... Section 4.4.10

PRODUCTION TESTS

100% Functional testing to insure proper trip and reset per ANSI/IEEE Standard 495-2007, "Guide for Testing Faulted Circuit Indicators", section 4.2.

TEST A1

Temperature Cycling Test

Object

To insure that the SDOH operates after temperature cycling aging in accordance with Section 4.4.1 of ANSI/IEEE 495-2007

Procedures

The SDOH was subjected to a minimum of five sequential thermal cycles with exposures at −40°C, 50°C, and 85°C with equilibrium achieved at each temperature. The SDOH was then retested.

Results

The SDOH units successfully passed all of the performance verification tests following the temperature cycling test.

TEST A2

Water Submersion Tests

Object

To insure that the SDOH performs satisfactorily after submersion cycling combined with temperature changes in accordance with Section 4.4.2 of ANSI/IEEE 495-2007.

Procedures

The SDOH was placed in a water submersion chamber with an equivalent pressure head of 4.5m +/- 0.5m (approximately 45kPa) at temperatures of 25ºC, 70ºC, 25ºC, 5ºC and then 25ºC. The times, temperatures and changes of submersion was meant to insure results equivalent to the products anticipated extreme operating conditions.

Results

The entire SDOH housing and body parts were inspected and showed no signs of deterioration or corrosion. The SDOH units successfully passed all of the performance verification tests following the water submersion test.

TEST A3

Outdoor Weathering Tests

Object

To insure that the SDOH performs satisfactorily when subjected to outdoor environments in accordance with Section 4.4.3 of ANSI/IEEE 495-2007.

Procedures

The SDOH was placed in a UV chamber for 500 hours where it was exposed to extreme QUV ultra violet and visible light. The period of exposure was meant to insure results equivalent to the product's anticipated service life.

Results

The entire SDOH housing and body parts were inspected and showed no signs of deterioration or corrosion. The SDOH units successfully passed all of the performance verification tests following the outdoor weathering test.

TEST A4

Salt Spray Tests

Object

To insure that the SDOH performs satisfactorily when subjected to extreme environments in accordance with Section 4.4.4 of ANSI/IEEE 495-2007.

Procedures

The SDOH was placed in a salt spray chamber 1500 hours where it was exposed to extreme moisture, salt spray and fog. The period of exposure was meant to insure results equivalent to the product's anticipated service life.

Results

The entire SDOH housing and body parts were inspected and showed no signs of deterioration or corrosion. The SDOH units successfully passed all of the performance verification tests following the temperature cycling test.

TEST A5

Electric Cord Pull-Out Test

Results

The SDOH does not have an electric cord in any of its configurations.

TEST A6

Impact Resistance Test

Object

To insure that the SDOH will not change from an indication of fault to normal, or from an indication of normal to fault due to normal handling in the field. Also, this will confirm that possible incidental impacts will not damage the FCI.

Procedures

The SDOH was dropped from a minimum of 6 feet onto a concrete surface. This was performed a minimum of 10 times on 3 units.

Results

The indicator remained in its prior state after impact. The SDOH units successfully passed all of the performance verification tests following the impact resistance test.

TEST A7

Short Time Current Test

Object

To verify that the SDOH withstands a short time current of significant magnitude and duration in accordance with Section 4.4.7 of ANSI/IEEE 495-2007.

Procedures

The SDOH was subjected to short time current in the 25,000 Amp class.

Results

The SDOH was retested to the original product specification and performed correctly. The SDOH units successfully passed all of the performance verification tests following the short time current test.

TEST A8

Adjacent Conductor Test

Object

To insure that the SDOH continues to indicate normal when a high current fault occurs on an adjacent conductor positioned no closer than the manufacturers specified.

Procedures

The SDOH was tested to ANSI/IEEE Standard 495-2007 paragraph 4.4.8. Test was performed in the 25,000 amp class per the stated requirements. Distance between conductors was six inches.

Results

When installed properly, the SDOH functioned correctly in response to a high current adjacent conductor fault. The SDOH units successfully passed all of the performance verification tests following the adjacent conductor test.

TEST A9

Trip Current Test

Object

To insure that the SDOH indicates a fault at the specified trip current level and that it continues to indicate normal for currents below the specified trip current level.

Procedures

The SDOH was tested to ANSI/IEEE Standard 495-2007 paragraph 4.4.9.

Results

The FCI performed successfully per the original product specification.

TEST A10

Reset Test

Object

To verify that the SDOH moves to an indication of normal from a faulted indication after the specified reset delay time and SDOH resets manually in accordance with Section 4.4.10 of ANSI/IEEE 495-2007.

Procedures

The SDOH was subjected to fault current sufficient enough to cause a fault indication on the display. The display was monitored to insure a fault indication for at least 235 minutes and return to normal indication within 245 minutes. The SDOH was subjected to fault current sufficient enough to cause a fault indication on the display. After 5 minutes, but before 235 minutes, the SDOH was manually reset using the hotstick mounted manual reset tool.

Results

The SDOH reset to a normal indication properly after the designed delay time of 4 hours (240 +/- 5 minutes). The SDOH reset to a normal indication after a manual reset.

TEST B

100% Functional Tests

Object

To insure that every SDOH manufactured operates properly prior to shipment.

Procedures

Every SDOH is tested for trip, manual reset, and mechanical functionality at various stages during production and again just prior to packaging to insure compliance with the designed product specifications. Every SDOH is tested for proper trip and reset per ANSI/IEEE 495-2007, “Guide for Testing Fault Circuit Indicators.”