

# **CIRCUIT BREAKERS**

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TÜV Rheinland do Brasil

## **1 – OBJECTIVE**

This document introduces the complementary criteria on the “Product Certification Rule: - RC-002, for the granting and maintenance of the license to use the Conformity Mark of SBAC, INMETRO and TÜV Rheinland do Brasil Ltda.

## **2 – FIELD OF APPLICATION**

This document applies to all companies in the segment – circuit breakers, in incoming, measurement and distribution switchboards, in residences, normally known as mini circuit breakers, or in monophasic, biphasic, triphasic and multiphasic executions for voltages up to 415V (Volts), nominal currents up to 63A (Amperes) and short circuit currents of up to 10kA (kilo amperes), companies which request the granting of license to use of SBAC Conformity Mark.

## **3 – COMPLEMENTARY DOCUMENTS**

INMETRO Administrative Rule No. 35, of 02/14/2005 (Circuit Breaker Conformity Evaluation Regulation).

INMETRO Administrative Rule No. 229, of 12/01/2005

Quality Technical Regulation for Low Voltage Circuit Breakers – RTQ (Inmetro Administrative Rule No. 243, of 10/06/2006)

PI-028 - Technical Committees – Formation and Prerogatives

NBR 5426:1985 - Sampling Plans and Procedures in the Inspection by Attributes

NBR IEC 60947-2: 1998 Low Voltage Handling and Command Devices - Circuit Breakers

NBR NM 60898: 2004 Surge Protection Circuit Breakers for Domestic and Similar Installations

NBR ISO 9001:00 Quality Management Systems – Requirements

NBR ISO 9001:05 Quality Management Systems – Grounds and Glossary

ABNT ISO/IEC Guide 2:2006 Norms and Related Activities – Glossary

## **4 – DEFINITION OF HOMOGENEOUS SERIES**

The definition of homogeneous series is applicable to all circuit breakers foreseen in this Requisite.

**4.1** – Circuit breakers may be considered as being from the same basic design and evaluated as a homogeneous series, if the following conditions are met:

- a) having the same basic design;
- b) the poles have the same external dimensions;
- c) the materials, finish and dimensions of internal current-carrying parts are identical, other than the variations detailed in 3.2a of this Attachment;
- d) the terminals are from similar project with the exception of the variations detailed in 3.2d of this Attachment;
- e) the contact\_size, material, configuration and method of attachment are identical;
- f) the manual operating mechanism (materials and physical characteristics) are identical;
- g) the molding and insulation materials are identical;
- h) the method, materials and construction of the extinction device are identical;

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- i) the basic design of overcurrent tripping device is identical, except for the variations detailed in 3.2b of this attachment;
- j) the basic design of instant activation device is identical, except for the variations detailed in item 3.2c of this attachment;
- k) the nominal voltage is directed to the same type of monophasic circuit breaker, bearing the same general dimensions per pole, with the exception of external barriers between poles.

### **4.2 – The following variations are admitted:**

- a) cross-sectional area of the internal current-carrying connections;
- b) dimensions and material of the overcurrent tripping device;
- c) number of turns and area of the straight section of the instantaneous overcurrent tripping toroid device;
- d) size of terminals.

### **5 – License for the Use of the Conformity Mark**

Complementary to RC002

The license for use of the Conformity Mark for circuit breakers shall be valid for 3 years, and shall contain:

- Types and models of the products with their respective project codes, and the corresponding technical standards, nominal voltages, nominal currents, symbol of instantaneous overcurrent (for ABNT NBR NM 60898:2004), nominal frequency, interruption capacities with their respective voltages ( $I_{cn}$ ,  $I_{cs}$  and  $I_{cu}$ ), reference temperature, performance categories (RTQ), categories of utilization (for NBR IEC 60947-2), number of poles, degree of protection (for NBR IEC 60947-2), grid distance, class of energy limitation if declared by the manufacturer (for ABNT NBR NM 60898:2004).

### **6 – CIRCUIT BREAKER SAMPLING AND TESTS**

#### **6.1 - INITIAL TESTS**

**6.1.1** – The initial tests in products of the same homogeneous series and different number of poles are the following for the type tests:

- a) tests described in Tables C1, C2, C3 and C4 of Attachment C of NBR NM 60898;
- b) tests described in item 10.2 of RTQ;
- c) tests described in Table 9 of NBR IEC 60947-2.

**6.1.2** – The initial tests for products certified by CPO operating out of Brasil and considering the existence of a memorandum of understanding between the CPOs are the following:

- a) sequence E2 and tests in items 9.10.1 and 9.10.2 of NBR NM 60898;
- b) program Z and item 7.2.1 item of RTQ;
- c) sequence III and item 7.2.1.2.4b test of NBR IEC 70947-2.

**6.1.3** – The number of parts necessary for test performance prescribed in the technical standards.

**6.1.4** - In case the repetition of tests is not foreseen in the standard, one more set of samples needed for the tests shall be collected. These supplemental samples shall be used in case of faults in the first sample, and nonconformities shall not be admitted in such set.

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### **6.2 – FOLLOW UP TESTS**

Follow up tests must be performed in the period of three (3) years, in all sequences foreseen in the standards. The order of performing the sequence shall be under common agreement between the manufacturer and TÜV to enable the programming and optimization of utilization of laboratories.

The follow up tests shall be performed as follows:

#### **6.2.1 – ABNT NBR NM 60898**

- 1st Semester – D0 Sequence (only 9.10.1 and 9.10.2);
- 2nd Semester – D0 Sequence (only 9.10.1 and 9.10.2) and E1, E2 for circuit breakers over 6kA;
- 3rd Semester – D0 Sequence (only 9.10.1 and 9.10.2);
- 4th Semester – D0 Sequence (only 9.10.1 and 9.10.2), C and D1;
- 5th Semester – D0 Sequence (only 9.10.1 and 9.10.2),
- 6th Semester – D0 Sequence (only 9.10.1 and 9.10.2), B and A (only 9.15).

- Number of samples:

- Sequence D0: 1 sample 1-pole of each nominal current, whereas, in each semester a type of curve shall be tested, and at the end of three years each curve shall have been tested at least once;

- Sequences E1 and E2: 3 samples 3-poles of the highest or of the lowest nominal current in each homogeneous series;

- Sequence C: 3 samples 3-poles of the highest or of the lowest nominal current in each homogeneous series;

- Item 9.15 of the standard: 1 sample 1-pole of the highest nominal current in each homogeneous series;

- Sequence B: 3 samples 3-poles of the highest nominal current in each homogeneous series;

- Sequence D1: 3 samples 3-poles of the highest nominal current in each homogeneous series.

#### **6.2.2 – RTQ**

- 1st Semester – Item 7.2.1 tests;
- 2nd Semester – item 7.2.1 tests and Program Y;
- 3rd Semester – item 7.2.1 tests;
- 4th Semester – item 7.2.1 tests and Program Z;
- 5th Semester – Item 7.2.1 tests;
- 6th Semester – Item 7.2.1 tests and Program X.

- Number of samples:

- Program Z: 3 samples of the highest or of the lowest nominal current in each homogeneous series;

- Program Y: 3 samples of the highest or of the lowest nominal current in each homogeneous series;

- Program X: 3 samples of the highest or of the lowest nominal current in each homogeneous series;

- Item 7.2.1: One unipolar sample (or lower number of poles) in each nominal current;

#### **6.2.3 – NBR IEC 60947-2**

- 1st Semester – Item 7.2.1.2.4b tests;
- 2nd Semester – Item 7.2.1.2.4b tests and Sequence II;
- 3rd Semester – Item 7.2.1.2.4b tests;
- 4th Semester – Item 7.2.1.2.4b tests and Sequence I;
- 5th Semester – Item 7.2.1.2.4b tests;

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- 6th Semester – Item 7.2.1.2.4b tests and Sequence II or III (for circuit breakers with capacity higher than 6kA).
- Number of samples:
- According to table 10 of NBR IEC 60947-2;
- For item 7.2.1.2.4b the test shall be performed in one part in each current.

**Note:** In case of changes in materials or in the design during the follow up of certification, additional tests shall be performed related to the changes occurred, at TÜV's discretion.

### **7 – ACTION TOWARD NONCONFORMITIES**

Should any nonconformity be noticed in the test for the maintenance of certificate, the test shall be repeated in two new samples for the nonconforming attribute, not being admitted any nonconformity. The confirmation of the nonconformity in the test for the maintenance of certification shall result in the immediate suspension of the license for use of the Conformity Mark related to the nonconforming circuit breaker.

**7.1 – Action in tests of D0 sequence (NBR NM 60898), item 7.2.1 (RTQ) and item 7.2.1.2.4b (NBR IEC 60947-2)**

- In occurring a nonconformity in a follow up test, which does not lead to a suspension of the certificate, this shall result in an additional sample of the nominal current (confirmation of result) where the nonconformity occurred in the follow up test in question, for the next follow up test.
- When this fact is repeated, the company shall submit a report on the corrective actions taken, which shall be verified in the next follow up tests.
- In the follow up performed with increase in number of samples, the reduction in such number may be considered, going back to the previous situation, if no nonconformity is displayed. If new nonconformity occurs, one more sample shall be added to the next follow up tests.

**7.2 – Testing of all other sequences (NBR NM 60898 and NBR IEC 60947-2) and all other programs (RTQ)**

- When there is a nonconformity in follow up testing which does not lead to the suspension of certificate, a new test shall be performed on the same sequence/program (Confirmation of results), within 6 months, with the increase of one sample.
- When such fact is repeated, the company shall submit report on corrective actions, which shall be verified in the next follow up tests.

### **8 - REQUIREMENTS FOR FACTORY QUALITY CONTROL**

**8.1 – Verification of Production under the supplier's responsibility, on 100% of production.**

**8.1.1 – Product according to NBR NM 60898 / RTQ Low Voltage Circuit Breakers / NBR IEC 60947-2**

- a) operating characteristics;
- b) making and breaking operation.

#### **8.2 – Routine Tests**

At the supplier's discretion and responsibility.

**8.2.1 – Product according to NBR NM 60898**

- a) checking the calibration with 255% In, according to item 9.10.1.2 of NBR NM 60898;
- b) instant activation test according to item 9.10.2 of NBR IEC 60898.

**8.2.2 – Product according to RTQ**

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- a) checking the calibration – RTQ, item 18.2;
- b) mechanical operation - RTQ, item 18.1;
- c) dielectric test – RTQ, item 18.3.

### **8.2.3 – Product according to NBR IEC 60947-2**

- a) according to item 8.4 of NBR IEC 60947-2.

## **9 – REQUIREMENT FOR FACTORY QUALITY CONTROL EVALUATION**

**9.1** – The initial and periodical evaluation of the factory quality control system shall be performed by TÜV.

**9.2** – The initial and periodical evaluation of the factory quality control system shall verify the compliance with the requirements listed below, when applicable to the scope of the Manufacturer's Quality Management System:

1. Records control – (\*) compliance with item 4.2.4 of the Standard
2. Production control – (\*) compliance with item 7.5.1 and 7.5.2
3. Product identification and traceability – (\*) compliance with item 7.5.3 of the Standard)
4. Product preservation – (\*) compliance with item 7.5.5 of the Standard
5. Measurement and monitoring device control – (\*) compliance with item 7.6 of the Standard
6. Product measurement and monitoring – (\*) compliance with item 8.2.4 of the Standard
7. Control of nonconforming product – (\*) compliance with item 8.3 of the Standard
8. Corrective action – (\*) compliance with item 8.5.2 of the Standard
9. Preventive action - (\*) compliance with item 8.5.3 of the Standard

**Note:** For this evaluation, the contents submitted in ISO 9001:2000 Quality Management Systems – Requirements, shall be used as reference.

## **10 – USE OF THE MARK, CERTIFICATION BY BATCH**

For certification by batch, see Inmetro's Administrative Ruling No. 35 of February 14, 2005.

## **11 – CERTIFICATION IDENTIFICATION IN THE AMBIT OF SBAC**

The circuit breaker manufacturer and the importer shall observe the following guidance for the use of seal of conformity identification:

- a) On the package, the seal may be printed or a label may be used bearing characteristics of indelibility and permanence, provided the minimum dimensions defined in this Requirement are attended to;
- b) In the product, when the conformity identification is engraved or imprinted by means of a seal, in case it does not fit the front of the circuit breaker, it may be placed on other parts of the circuit breaker;
- c) The black and white version may be used on the packaging only in case the unit has a color similar to that of the colored seal;
- d) In the product, although preferably the colored seal shall be used, the use of the black and white and reduced version is admitted, as stated below.

**CIRCUIT BREAKERS**

**SECURITY**



**Pantone 1235**

- 100%
- 80%

**CMYK**

- C0 M27 Y76 K2
- C0 M20 Y75 K2

**Compact**



**Single color**

**Minimum size**



**Shades of Gray**

- 100%
- 90%
- 70%



**Single color**

# CIRCUIT BREAKERS

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Pantone 1235

- 100%
- 80%

CMYK

- C0 M27 Y76 K2
- C0 M20 Y75 K2

Compact



Shades of Gray

- 100%
- 90%
- 70%



Single color

Single color

Minimum size



**Soon UC:** to be used only for customers who still use it in its products and packings.

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## **12 – REVISION STATUS**

Item 11 – Certification Identification in the ambit of SBAC.

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