Elaborated by: Douglas Ferreira / João Raphael Abel Checked by: Ana Paula Tamasia

Approved by: Nelson Coelho Approval date: 09/03/2016

1 – OBJECTIVE

This document presents the complementary criteria of the "Rule for the Certification of Product" – 700-RC-001 for the grant and maintenance of the license for the use of the Voluntary Conformity Mark of TÜV Rheinland do Brasil Ltda.

2 – APPLICATION FIELD

Applicable to all the companies that request the grant of the license to use the voluntary Conformity Marking on the products:

- HD 21.5 S3:1994/A2:2001 - Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)
- IEC 60227-5 – Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords);
- IEC 60245-4 – Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables;
- IEC 60245-8 - Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 8: Cords for applications requiring high flexibility;
- NBR 7286 – Power cables with extruded ethylene propylene rubber insulation (EPR) for rated voltages from 1 kV up to 35 kV - Performance requirements;
- ABNT NBR 7287 - Power cables with extruded cross-linked polyethylene insulated power cable for rated voltages from 1 up to 35 kV - Performance requirements;
- ABNT NBR 7289 - PE or PVC insulated control cables, for rated voltages up to and including 1 kV - Performance requirements;
- ABNT NBR 9114 - Flexible insulated conductors with EPR insulation for 130 °C, applied on internal connections for rated voltages up to 750 V - Specification;
- ABNT NBR 9117 - Flexible or non-flexible conductors insulated with polyvinyl chloride compound (PVC/EB) for temperatures up to 105°C and voltages up to 750 V, for internal uses of electrical appliances;
- NBR 10300 - Instrumentation cables for rated voltages up to and including 300 V - Specification.
- IEC 60245-3 - Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 3: Heat resistant silicone insulated cables
- UNIT IEC 227-4 - Cables with insulation in PVC for voltage rated up to 450/750 V. Part 4: cables with sheath for fixed installations;
- ABNT NBR NM 60454-3-1 - Specifications for pressure-sensitive adhesive tapes for electrical purposes Part 3: Specifications for individual materials - Sheet 1: PVC film tapes with pressure-sensitive adhesive (IEC 60454-3-1, MOD)
- IEC 60454-3-1 - Pressure-sensitive adhesive tapes for electrical purposes – Part 3: Specifications for individual materials – Sheet 1: PVC film tapes with pressure-sensitive adhesive;
- ABNT NBR 15977 - Flexible cable, insulated with EPR or HEPR and covered with PVC STF for 90 °C and for rated voltages up to 750 V - Specification

3 – RESPONSIBILITY

The responsibility for the revision of this "Complement" is of TÜV Rheinland do Brasil Ltda.

4 – ACRONYM AND ABBREVIATION

The requirements of the clause 4 of the Rule **700-RC-001** are applicable.

5 – DEFINITIONS

The requirements of the clause 5 of the Rule – **700-RC-001** are applicable, including those below:

5.2 – License for the use of the Conformity Mark

5.2.1 The requirements of the clause 5.2 are:

The item a) is applicable with the revised statement to: corporate's name, tax ID number or register and address, of the Applicant and of the Manufacturer.

Note: The foreign companies, without Representative Person in Brazil, must present the legal document "articles of incorporation" in the country of origin;

The item b) is applicable, being the identification of the license for the use of the Conformity Mark, the number of the certificate. The issue date and the validity term are applicable;

The item c) is not applicable for this "Complement"

5.2.2 Beyond the requirements established in the item 5.2, the license must contain

d) If applicable, the system of certification is the Model 5.

e) The effected date of the certificate;

f) The product description;

g) The technical standards applicable to the certified product;

h) The grant for the use of the marking (License for the use of the Conformity Marking of TÜV Rheinland do Brasil)

5.2.3 The license for the use of the Conformity Marking for Wires, Cables, Cords and Adhesive Tapes is of 2 years.

Note: The valid term can have adjustment in order to allow that the valid term is included in all the expected activities for the o period. For example: when the company is already customer with other issued certificates, and/or in function of the dates of the expected audits.

5.3 – Lot

Not applicable the requirements of the clause 5.3 of the Rule – **700-RC-001**.

5.5 – Certification Commission of TÜV (Technical Commission of TÜV):

For the voluntary certifications, with or without scope of accreditation, considering this "Complement", it is formed one commission composed by, at least, representative of the professional association of the manufacturers, consumers and neutral organizations, all of them with recognized competence.

5.6 – Complementary Documents

ABNT ISO/IEC Guide 2:1998 - Standardization and related activities – General vocabulary;

NBR ISO 9001:2008 - Quality management systems - Requirements;

ABNT ISO/IEC 17030:2005 – Conformity assessment - General requirements for third-party marks of conformity;

ABNT ISO/IEC 17025:2005 – General requirements for the competence of testing and calibration laboratories;

ABNT ISO/IEC 17000:2005 – Conformity assessment - Vocabulary and general principles;

ABNT ISO/IEC Guide 67:1998 – Conformity assessment - Fundamentals of product certification;

ABNT ISO/IEC Guide 28:1998 – Conformity assessment - Guidance on a third-party certification system for products;

ABNT ISO/IEC Guide 65:1997 – General requirements for bodies operating product certification systems;

Law nº 8.078/1990 – Consumer Defense Code, section IV – Abusive Practices.

INMETRO rule nº 268 from June 21st, 2011 - electrical devices used in Electrical Installations of Low Voltage up to 1 kV with nominal rated current up to 63A

6 – GENERAL CONDITIONS

The requirements of the clause 6 of the Rule – **700-RC-001** are applicable.

7 – GRANT CONDITIONS

The requirements of the clause 7 of the Rule – **700-RC-001** are applicable.

8 – MECHANISM OF EVALUATION OF THE CONFORMITY

The mechanism for the evaluation of the conformity is the Certification. The model of Certification to be used is the model with type tests, evaluation and qualification of the quality system of the manufacturer, surveillance through audits at the manufacturer and test on the samples taken in the market and at the manufacturer – Model 5.

Applicable the steps established in the clause 8 of the Rule – 700-RC-001, complemented with the one below:

8.5 – Initial Audit

8.5.2 – The checked items for the initial audit are the established in the Annex A of this "Complement".

8.6 – Type test

The type tests are the tests established in the annex B of this "Complement".

8.7 – Maintenance Certification

8.7.1 The evaluation of the quality system of the manufacturer is through the surveillance audits performed according to the established in the annex A of this "Complement".

8.7.2 The surveillance tests will be performed according to the established in the annex B of this "Complement".

8.8 – Renewal

The renewal is performed when the presentation of the processes to the TÜV Rheinland Brazil Technical Commission, with the test results and of the surveillance audits.

9 – CERTIFICATION ACTIVITIES RECOGNITION

The requirements of the clause 9 of the Rule – 700-RC-001 are applicable, with the following changes as described below:
9.2.2.1 – The laboratory must be accredited by an accreditation body signatory of agreement for the mutual recognition, established by one of the cooperations below. The scope of this agreement signed must include the accreditation of the laboratories of test.

- Interamerican Accreditation Cooperation (IAAC);
- European co-operation for Accreditation (EA);
- International Laboratory Accreditation Cooperation (ILAC);

Note 1: When the Laboratory accredited for the first part, the tests must be followed by TÜV or a CB with who TÜV has MOU (Memorandum Of Understanding).
Note 2: not applicable.

10 – APPLICANT OBLIGATIONS (LICENSE HOLDER)

The requirements of the clause 10 of the Rule – **700-RC-001** are applicable.

11 – CERTIFICATION BODY OBLIGATIONS

The requirements of the clause 11 of the Rule – **700-RC-001** are applicable.

12 – EXTENSION OR REDUCTION OF THE CERTIFICATION SCOPE

The requirements of the clause 12 of the rule – **700-RC-001** are applicable.

13 – APPEAL

The requirements of the clause 13 of the rule – **700-RC-001** are applicable.

14 – CERTIFICATION VALIDITY AND MAINTENANCE

The requirements of the clause 14 of the Rule – **700-RC-001** are applicable.

15 – COMPLAINT AND DENUNCIATION

The requirements of the clause 15 of the Rule – **700-RC-001** are applicable.

16 – INADEQUATED USE OF THE CERTIFICATION

The requirements of the clause 16 of the Rule – **700-RC-001** are applicable.

17 – SUSPENSION OF THE CERTIFICATION

The requirements of the clause 17 of the Rule – **700-RC-001** are applicable.

18 – CANCELATION OF THE CERTIFICATION

The requirements of the clause 18 of the Rule – **700-RC-001** are applicable

19 – RESIGNATION

The requirements of the clause 19 of the Rule – **700-RC-001** are applicable.

20 – VARIATION OF THE REQUIREMENTS OF THE CERTIFICATION

The requirements of the clause 20 of the Rule – **700-RC-001** are applicable.

22 – REVISION

Date	Revision	Responsible
23\8\13	Change the number of documents	Gabriela Halphen
01\4\12	Included the products of the standards ABNT NM 287-4:2009 and NM 287-4:2006 and the item B.3.18.3.; and Revised the items 9 and B.3.13.	
17/07/2014	Inclusion of the annex related to the standard IEC 60245-3; Excluded the annexes related to the standards NBR 13248, NBR NM 247-5, NBR NM 274, NBR NM 247-3 and NBR NM 287-4 because they are already included in the INMETRO rule nº 640/2012 and CRC for mandatory certification;	Nelson

	Excluded the annex related to the standard NBR 13249 because this product included in the standard NBR NM 287-4, in the INMETRO rule nº 640/2012 and CRC for mandatory certification; Included the annex B.3.2 IEC 60227-5:2003, the types of PVC compounds related to the cable designations 60227 IEC 56 and 60227 IEC 57; and Revised the configuration of the document.	
27/01/2015	Inclusion of the annex **B.3.14** related to the standard ABNT NBR 15977.	Paloma / Douglas
09/03/2016	Inclusion of the annex **B.3.15 and B.3.16** related to the standards ISO 6722:2006 and ISO 14572:2006	João Raphael Abel / Douglas Ferreira

ANNEX A – EVALUATION OF THE QUALITY CONTROL SYSTEM OF THE MANUFACTURER

A.1 – The evaluation, initial and periodic, of the quality control system of the manufacturer, will be performed by TÜV RHEINLAND DO BRASIL.

A.2 – The evaluation, initial and periodic, of the quality control system of the manufacturer must check the fulfillment of the requirements listed below, when applicable in the scope of the Quality Management System of the manufacturer:

1. Control of records - (*) to fulfill the item 4.2.4 of the standard
2. Control of production - (*) to fulfill the item 7.5.1 and 7.5.2
3. Identification and traceability - (*) to fulfill the item 7.5.3 of the standard
4. Preservation of the product - (*) to fulfill the item 7.5.5 of the standard
5. Control of monitoring and measuring equipment - (*) to fulfill the item 7.6 of the standard
6. Monitoring and measurement of product - (*) to fulfill the item 8.2.4 of the standard
7. Control of nonconforming product - (*) to fulfill the item 8.3 of the standard
8. Corrective action - (*) to fulfill the item 8.5.2 of the standard
9. Preventive action - (*) to fulfill the item 8.5.3 of the standard

Note: For this evaluation, will be used, as reference, the content presented in the NBR ISO 9001:2008 Quality Management Systems - Requirements.

A.3 – In the evaluation, initial and periodic of the quality control system of the manufacturer, will be checked the correct operation of the spark test, as its effectiveness and as its calibration in the voltage range applied by the manufacturer in the specified conditions by the respective standards.

A.4 – In the evaluation, initial and periodic, the quality control system of the manufacturer, will be checked the execution, by the manufacturer, the routine tests specified in the respective standards and their results.

Note: see the paragraph B.2.3 for the routine tests.

A.5 – If the manufacturer has its quality system certified by a Certification Body accredited by INMETRO according to NBR ISO 9001:2008, TÜV RHEINLAND DO BRASIL must analyze the document related to the certification of the quality system, assuring that the requirements described above were evaluated focusing the product to be certified. Otherwise, TÜV RHEINLAND DO BRASIL must check the fulfillment of the requirements described in the items A.2, A.3 and A.4.

A.6 – The periodic evaluation of the quality system of the manufacturer will be performed, at least, once at each 6 (six) months after has been granted the license for the use of the Conformity Marking.

ANNEX B – TESTS AND SAMPLES

B.1 The tests described in this CRC are established in the specific standards, any amendment, or update in the version of these standards, will be able to use only with the authorization of TÜV Rheinland do Brasil.

B.2 General

The collect of samples for the tests is carried out by TÜV Rheinland do Brasil.

B.2.1 Initial or Certification Tests

The certification tests and the respective samplings for each product established in this Complement are defined in the annexes B.3.x.1.
In case of prototypes, the manufacturer can collect and forward the necessary samples to the Laboratory and/or TÜV Rheinland do Brasil, in accordance with them, and under responsibility of TÜV Rheinland do Brasil.
The approval on the tests does not exempt TÜV Rheinland do Brasil about validating the products after the beginning of the operation of the line of production.

B.2.2 – Surveillance tests

The conduction of the surveillance tests will be carried out by TÜV Rheinland do Brasil, being taken from the commerce (or from the factory's logistics) and from the stock of the manufacturer, alternately.
The periodicity of the tests performance will be at each 6 months, after the grant of the license for the use of the Conformity Marking.
At the end of the cycle of 04 (four) semesters, the sequence must be restarted.
The collected samples must be sent to the laboratory within a term of 15 days after the collect. If these samples are not sent within the established term, the certificates will be able to be suspended.

B.2.2a For the products: wires, cables and cords, established in this Complement.

The surveillance tests are established in the annexes B.3.x.2.
One section of each conductor class will be collected, 1 and 2, made, and for the conductor classes 4, 5 or 6, just on one unique sample, of its highest conductor class, preferably.
For each surveillance test of one kind of product, will be collected one different section, preferably.
The necessary quantity is of 1 unit of logistics, if coil of 100m, or if reel, or length of 30 meters, at minimum.
For the vertical burning test, when applicable, the quantity will be established considering the requested/selected section.
For the electrical resistivity and copper elongation tests, when applicable, will be carried out on the samples collected in the manufacturing process, after the annealing process of the drawn wire and before of the next process. The necessary quantity is of 10 meters, at minimum.

B.2.2.b For the product: adhesive tape, established in this Complement.

The surveillance tests and the respective samplings are established in the annex B.3.x.2.

B.2.3 Routine tests

B.2.3.a For the products: wires, cables and cords, established in this Complement.

The routine tests are considered, at minimum, the tests of marking checking, construction checking, dimensional checking, conductor electrical resistance at 20ºC, high voltage test, insulation resistance at 20ºC or, when it is not specified, the maximum temperature of operation, and spark test.
The tests will be carried out by the manufacturer and must include all the lots (batches) of the made materials and approved for the stock /commerce.
The samplings will be as established in the respective standards of the product.

B.2.3.b For the product: adhesive tape established in this Complement.

The routine tests and the respective samplings are established in the annex B.3.x.3.

B.2.4 Periodical tests

B.2.4.a For the products: wires, cables and cords, established in this Complement.

The periodical tests are not established, however, we recommend that the following tests be carried out as: mechanical characteristics for insulation and sheath (if exists): tensile strength and elongation at break, before and after ageing, at minimum at each development of new suppliers / raw-materials.

B.2.4.b For the product: adhesive tape, established in this Complement.

The periodical tests are not established. However, we recommend that thermal index test (complete test) for each product be performed, at least once a year.

B.3 Particularities

The tests for the products established in this "Complement" are described from the items B.3.1 to B.3.14.

B.3.1 HD 21.5 S3:1994/A2:2001

The sale of cable in the Brazilian commerce must fulfill the requirements of the INMETRO rule nº 640/2012.

B.3.1.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking, including ovality:
- ✓ Electrical resistance at 20ºC;
- ✓ Voltage test;
- ✓ High voltage test on cores;
- ✓ Insulation resistance at 70ºC;
- ✓ Long term resistance of insulation to d.c.;
- ✓ Absence of faults on insulation;
- ✓ Mechanical characteristics (insulation and sheath);
- ✓ Loss of mass (insulation and sheath);
- ✓ Pressure at high temperature (insulation and sheath);
- ✓ Bending test(insulation and sheath);
- ✓ Cold impact test;
- ✓ Heat shock (insulation and sheath);
- ✓ Test of flexibility;
- ✓ Test under fire conditions;
- ✓ Elongation test for sheath only for H05VV-F and H05VVH2-F; and
- ✓ Test of non-contamination (only applicable to the cables type H05VV-F and H05VVH2-F).

B.3.1.1.a Sampling

The necessary quantity of samples to be tested is indicated in the table below:

Product	Nº of cores	Conductor class	Voltage (V)	Code designation	Type tests
Circular cables	2 to 4	5	300/300	H03VV-F	One sample of any section and any number of conductor inside the scope
Flat cables	2			H03VVH2-F	One sample of any section and any number of conductor inside the scope
Circular cables	2 to 5	5	300/500	H05VV-F	One sample of the minimum section and maximum number of cores
					One sample of the maximum section and minimum number of cores
Flat cables	2	5	300/500	H05VVH2-F	One sample of any section and any number of conductor inside the scope

B.3.1.2 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as its obligatoriness of its use in the conditions specified by the standard HD 21.5 and as its calibration in the voltage range applied by the manufacturer. Beyond of that, must be always performed the following type tests on each one of the samples:

- ✓ Marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking, including ovality:
- ✓ Voltage test;
- ✓ Electrical resistance at 20ºC;
- ✓ Insulation resistance at the maximum temperature of operation; and
- ✓ Absence of faults on insulation.

B.3.1.2.a Beyond the tests mentioned in the previous item, must be carried out the tests below, in accordance with the established period, having as reference the grant of the license for the use of the Conformity Marking.

For insulation in PVC TI 2 and sheath in PVC TM 2

✓ 1º Semester: pressure test at high temperature (insulation/sheath) and loss of mass test (insulation/sheath);

✓ 2º Semester: mechanical characteristics (insulation/sheath), bending test (insulation/sheath) and cold elongation applicable only for H05VV-F and H05VVH2-F;

✓ 3º Semester: test under fire conditions, voltage test on cores and heat shock (insulation and sheath); and

✓ 4º Semester: cold impact test, test of flexibility and test of non-contamination (applicable only for H05VV-F and H05VVH2-F).

B.3.2 IEC 60227-5:2003

The sale of cable in the Brazilian commerce must fulfill the requirements of the INMETRO rule nº 640/2012.

B.3.2.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking, including ovality:
- ✓ High voltage test;
- ✓ Electrical resistance at 20ºC;
- ✓ Insulation resistance at the maximum temperature of operation;
- ✓ Pressure at high temperature (insulation and sheath);
- ✓ Loss of mass (insulation and sheath);
- ✓ Mechanical characteristics (insulation and sheath);
- ✓ Bending test(insulation and sheath); and
- ✓ cold bending/elongation (applicable to 60227IEC57, insulation and sheath);
- ✓ Heat shock (insulation and sheath);
- ✓ Flame resistance test;
- ✓ Voltage tests on cores;
- ✓ Cold impact test;
- ✓ Flexing test followed of voltage test;
- ✓ Non-contamination test (applicable for cables type 60227IEC53);
- ✓ Thermal stability – insulation and sheath (applicable for cables type 60227 IEC 56 or 57);
- ✓ Compatibility (applicable for cables type 60227IEC57).

B.3.2.1.a Sampling

The necessary quantity of samples to be tested is indicated in the table below:

Product	Nº of cores	Conduct or class	Voltage (V)	Code designation	Type tests
Circular cables	2 to 3	5	300/300	60227 IEC 52 H03VV-F	One sample of any section and any number of conductor inside the scope
				60227 IEC 56 H03V2V2-F	One sample of any section and any number of conductor inside the scope
Flat cables	2	5	300/300	60227 IEC 52 H03VVH2-F	One sample of any section and any number of conductor inside the scope
				60227 IEC 56 H03V2V2H2-F	One sample of any section and any number of conductor inside the scope
Circular cables	2 to 5	5	300/500	60227 IEC 53 H05VV-F	One sample of the minimum section and maximum number of cores
					One sample of the maximum section and minimum number of cores
				60227 IEC 57 H05V2V2-F	One sample of the minimum section and maximum number of cores
					One sample of the maximum section and minimum number of cores
Flat cables	2	5	300/500	60227 IEC 53 H05VVH2-F	One sample of any section and any number of conductor inside the scope
				60227 IEC 57 H05V2V2H2-F	One sample of any section and any number of conductor inside the scope

B.3.2.2 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as its obligatoriness of its use in the conditions specified by the standard IEC 60227-5 and as its calibration in the voltage range applied by the manufacturer. Beyond of that, must be always performed the following type tests on each one of the samples:

- ✓ Marking checking;
- ✓ Construction checking and dimensional (ovality, if applicable);
- ✓ Voltage test;
- ✓ Electrical resistance at 20ºC; and
- ✓ Insulation resistance at the maximum temperature of operation.

B.3.2.2.a Beyond the tests mentioned in the previous item, must be carried out the tests below, in accordance with the established period, having as reference the grant of the license for the use of the Conformity Marking.

For insulation in PVC/D or PVC/E and sheath in PVC ST5 or PVC ST10

- ✓ 1º Semester: pressure test at high temperature (insulation/sheath) and loss of mass test (insulation/sheath);

✓ 2º Semester: mechanical characteristics (insulation/sheath) and cold bend test (insulation/sheath);
✓ 3º Semester: flame resistance, voltage test on cores and heat shock (insulation and sheath); and
✓ 4º Semester: cold impact test (applicable only for 60227 IEC 52, 53 and 57), flexing test followed by voltage test, test of non-contamination (applicable only for 60227 IEC 53), thermal stability (applicable only for 60227 IEC 56 and 57, insulation and sheath), compatibility test (applicable only for 60227 IEC 57).

B.3.3 IEC 60245-4:2004

The sale of cable in the Brazilian commerce must fulfill the requirements of the INMETRO rule nº 640/2012.

B.3.3.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking, including ovality:
- ✓ High voltage test;
- ✓ Electrical resistance at 20ºC;
- ✓ Flexing test followed by voltage test;
- ✓ Mechanical characteristics (insulation and sheath);
- ✓ High voltage test on cores;
- ✓ Hot set (insulation and sheath);
- ✓ Ozone resistance (insulation);
- ✓ Tensile test after ageing in the air bomb (insulation and sheath for 60245 IEC 53) – (insulation for 60245 IEC 57 or 66);
- ✓ Bending test (sheath for 60245 IEC 57);
- ✓ Bending test/elongation at low temperature (sheath for 60245 IEC 66);
- ✓ Immersion in oil (sheath for 60245 IEC 57 or 66)

B.3.3.1.a Sampling

The necessary quantity of samples to be carried out the tests is indicated in the table below:

Product	Nº of cores	Conductor class	Voltage (V)	Code designation	Samples
Circular cables	2 to 5	5	300/500	60245 IEC 53 H05RR-F	One sample of the minimum section and maximum number of cores
					One sample of the maximum section and minimum number of cores
				60245 IEC 57 H05RN-F	One sample of the minimum section and maximum number of cores
					One sample of the maximum section and minimum number of cores
	1 to 5	5	450/750	60245 IEC 66 H07RN-F	One sample of the minimum section and maximum number of cores
					One sample of the maximum section and minimum number of cores

B.3.3.2 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as to its obligatoriness of its use according to the conditions established in the standard IEC 60245-4 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests at each one of the samples taken:

- ✓ Marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking (ovality);
- ✓ Voltage test; and
- ✓ Electrical resistance.

B.3.3.2.a Beyond the mentioned tests in the previous item, must be carried out the tests below, according to the period established, having as referent the grant of the license for the use of the Conformity Marking.

For insulation/sheath in rubber

✓ 1º Semester: flexing test followed by voltage test, bending test (applicable only for 60245 IEC 57), bending test/elongation test (applicable only for 60245 IEC 66);

✓ 2º Semester: mechanical characteristics (insulation/sheath), immersion in oil (applicable only for 60245 IEC 57 and 60245 IEC 66, insulation and sheath);

✓ 3º Semester: voltage test on cores and hot set test (insulation/sheath); and

✓ 4º Semester: ozone resistance (insulation), tensile test after ageing in air bomb (insulation for 60245 IEC 53 and insulation and sheath for 60245 IEC 57 and 60245 IEC 66).

B.3.4 IEC 60245-8:2004

The sale of cable in the Brazilian commerce must fulfill the requirements of the INMETRO rule nº 640/2012.

B.3.4.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking, including ovality and percentage of coverage of the textile braid;
- ✓ Voltage test;
- ✓ Electrical resistance at 20ºC;
- ✓ Three pulley flexing test;
- ✓ Kink test;
- ✓ Solderability test (plain conductors);
- ✓ Mechanical characteristics;
- ✓ Wear resistance;
- ✓ Voltage test on cores;
- ✓ Hot set test;
- ✓ Resistance to heat of textile braid;
- ✓ Ozone resistance (method A); and
- ✓ Tensile test after ageing in the air bomb.

B.3.4.2 Sampling

Product	Nº of cores	Conductor class	Voltage (V)	Cable types	Samples
Textile braid cord	2 and 3	6	300/300	60245 IEC 89 H03RT-H	One sample of the minimum section and maximum number of cores

Notes:

If the manufacturer does not make anyone of the cables indicated, must be used the closest possible.

B.3.4.3 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as to its obligatoriness of its use according to the conditions established in the standard IEC 60245-8 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests at each one of the samples taken:

- ✓ Marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking (ovality);
- ✓ Voltage test; and
- ✓ Electrical resistance at 20ºC;

B.3.4.3.a Beyond the mentioned tests in the previous item, it must be carried out the tests below, in accordance with the established period, having as reference the grant of the license for the use of the Conformity Marking.

- ✓ 1º Semester: three pulley flexing test, kink test and solderability test (plain conductor);
- ✓ 2º Semester: mechanical characteristics and wear resistance;
- ✓ 3º Semester: voltage test on cores, hot set test and resistance to heat of textile braid; and
- ✓ 4º Semester: ozone resistance (method A) and tensile test after ageing in the air bomb.

B.3.5 NBR 7286:2001

B.3.5.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance a 20ºC;
- ✓ Voltage test;
- ✓ Insulation resistance at 20º C;
- ✓ Voltage test of long term;
- ✓ Insulation resistance at 90ºC;
- ✓ Heat shock (sheath);
- ✓ Pressure test at high temperature (sheath);
- ✓ Mechanical properties (insulation and sheath);
- ✓ Loss of mass (sheath);
- ✓ Cold impact test;
- ✓ Test of non-contamination;
- ✓ Flame resistance test;
- ✓ Hot set test (insulation);
- ✓ Bending test/ elongation at low temperature (sheath);
- ✓ Tensile test after ageing in the air bomb (insulation):
- ✓ Ozone resistance test (insulation);
- ✓ Water absorption (insulation – gravimetric);

B.3.5.1.a Sampling

The necessary quantity of samples to perform the tests is established in the standard NBR 7286 and it corresponds to the indicated in the table.

Cable type	**Conductor class**	**Initial tests**
		Type
Unipolar, multipolar or multiplexed	1, 2, 4 or 5	On the lowest section of the highest conductor class and on the highest section of the lowest conductor class made.

The maximum section for the initial tests is 120mm².

B.3.5.2 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as to its effectiveness and as to its calibration in the voltage range applied by the manufacturer, in the specified conditions by the standard NM 244.

Beyond of that, will be performed in all the surveillance, the following type tests:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance at 20ºC;
- ✓ Voltage test; and
- ✓ Insulation resistance at 20º C.

B.3.5.2.a Beyond the mentioned test above, will be performed the tests listed below, according to the periodicity established.

- ✓ 1º Semester: insulation resistance at 90ºC, heat shock (sheath) and pressure test at high temperature (sheath);
- ✓ 2º Semester**:** mechanical characteristics (insulation and sheath), loss of mass (sheath) and cold impact test;
- ✓ 3º Semester: test of non-contamination, flame resistance test, hot set test (insulation) and cold bending/elongation at low temperature (sheath); and
- ✓ 4º Semester**:** tensile test after ageing in the air bomb (insulation), ozone resistance (insulation), water absorption – gravimetric method (insulation) and voltage test of long term.

B.3.6. ABNT NBR 7287:2009

B.3.6.1 Initial tests

The initial tests are the type tests established below:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance at 20ºC;
- ✓ Voltage test;
- ✓ Insulation resistance at a 20º C;
- ✓ Long duration voltage test;
- ✓ Insulation resistance at 70ºC;
- ✓ Mechanical characteristics (insulation and sheath); and
- ✓ Flame resistance;
- ✓ Test of non-contamination;
- ✓ Hot set test (insulation);
- ✓ Water absorption (insulation – gravimetric);
- ✓ Heat shock (sheath);
- ✓ Pressure test at high temperature (sheath);
- ✓ Bending test/elongation test (sheath);
- ✓ Loss of mass test (sheath);
- ✓ Cold impact test.

B.3.6.1.a Sampling

The necessary quantity of samples to have carried out the tests is established in the standard NBR 7287 and it corresponds to the indicated in the table:

Cable type	Conductor class	Initial tests	
		Type	Additional
Unipolar or multiplexed	1, 2, 4 or 5	On the smallest section of the highest class of conductor and on the highest section of the smallest class of conductor made	On the smallest section of the class 1 or 2
Multipolar	1, 2, 4 or 5	On the smallest section of the highest class of conductor and on the highest section of the smallest class of conductor made	On the smallest section of the class 1 or 2

The maximum section to have carried out the initial tests is 120mm².

B.3.6.2 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as to its obligatoriness of its use according to the conditions established in the standard NBR 7287 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests at each one of the samples taken:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance at 20ºC;
- ✓ Voltage test; and
- ✓ Insulation resistance at 20º C.

B.3.6.2.a Beyond the mentioned tests in the previous item, it must be carried out the tests below, in accordance with the established period, having as reference the grant of the license for the use of the Conformity Marking.

- ✓ 1° Semester: Insulation resistance at 90ºC; Heat shock (sheath); and Pressure test at high temperature (sheath);
- ✓ 2° Semester: Mechanical characteristics (insulation and sheath); Loss of mass test (sheath); and Cold impact test;
- ✓ 3° Semester: Test of non-contamination; Flame resistance; Hot set test (insulation); and Bending test/ elongation test (sheath); and
- ✓ 4° Semester: Water absorption (insulation – gravimetric); and Long duration voltage test.

B.3.7 NBR 7289:2000, for the control cables with insulation in PVC/A and sheath in ST1

B.3.7.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance;
- ✓ High voltage;
- ✓ Insulation resistance at 20ºC;
- ✓ Insulation resistance at 70ºC;
- ✓ Long term high voltage test;
- ✓ Mechanical characteristics (insulation and sheath);
- ✓ Flame resistance / vertical burn / oxygen index;
- ✓ Heat shock (insulation and sheath);
- ✓ Pressure at high temperature (insulation and sheath);
- ✓ Cold bending / elongation (insulation and sheath);
- ✓ Cold impact test;
- ✓ Water absorption (insulation).

B.3.7.1.a Sampling

The necessary quantities of samples for the tests are those established in NBR 7289 and correspond to the indicated in the table.

Cable type	Voltage	Conductor class	Initial tests
			Type
Unipolar, multipolar or multiplexed	500V	1, 2, 4, 5 or 6	On the smallest section of the highest conductor class, with the highest number of cores, and on the highest section of the smallest conductor class made
Unipolar, multipolar or multiplexed	1kV	1, 2, 4, 5 or 6	On the smallest section of the highest conductor class, with the highest number of cores, and on the highest section of the smallest conductor class made

B.3.7.2 Surveillance tests

At each six months will be checked the correct functioning of the spark tester, as to its obligatoriness of its use according to the conditions established in the standard NBR 7289 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests on each one of the samples taken:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage test; and
- ✓ Insulation resistance at 20º C.

B.3.7.2.a Beyond of the tests mentioned previously, must be carried out the tests as indicated below, according to the established periodicity, having as reference the grant of the license for the use of the Conformity Marking.

- ✓ 1° Semester: Pressure at high temperature (insulation and sheath); Insulation resistance at 70ºC.
- ✓ 2° Semester: Mechanical characteristics (insulation and sheath); Cold bending / elongation (insulation and sheath);
- ✓ 3° Semester: Flame resistance / vertical burn / oxygen index; Heat shock (insulation and sheath);
- ✓ 4° Semester: Cold impact test; Absorption (insulation); Long term high voltage;

B.3.8 NBR 9114:2010

B.3.8.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Construction/dimensional;
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage;
- ✓ Insulation resistance at 20º C;
- ✓ Mechanical characteristics;
- ✓ Insulation resistance at 95ºC;
- ✓ Tensile test after ageing in the air oven;
- ✓ Ozone resistance test;
- ✓ Hot set test;
- ✓ Water Absorption– gravimetric method;
- ✓ Compatibility between the plain copper conductor and the insulation in EPR.

B.3.8.1.a Sampling

The necessary quantities of samples for the tests are those established in the standard NBR 9114 and correspond to the indicated in the table.

Cable type	**Conductor class**	**Initial tests**
		Type
Unipolar	4, 5 or 6	On the smallest section of the highest conductor class and on the highest section of the smallest conductor class made

B.3.8.2 Surveillance tests

At each six months will be checked the correct functioning of the spark tester, as to its obligatoriness of its use according to the conditions established in the standard NBR 9114 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests on each one of the samples taken:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage test; and
- ✓ Insulation resistance at 20º C.

B.3.8.2.a Beyond of the tests mentioned previously, must be carried out the tests as indicated below, according to the established periodicity, having as reference the grant of the license for the use of the Conformity Marking.

- ✓ 1° Semester: Hot set test
- ✓ 2° Semester: Mechanical characteristics; Compatibility between the plain copper conductor and insulation in EPR
- ✓ 3° Semester: Tensile test after ageing in the air bomb; Ozone resistance test
- ✓ 4° Semester: Insulation resistance test at 95ºC; Water absorption – gravimetric method

B.3.9 NBR 9117:2006

B.3.9.1 Initial tests

The initial tests are the type tests established:

- ✓ Label marking checking;
- ✓ Product marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking;
- ✓ Electrical resistance;
- ✓ High voltage test;
- ✓ Insulation resistance at 20ºC;
- ✓ Long term high voltage test;
- ✓ Insulation resistance at 95ºC;
- ✓ Mechanical characteristics;
- ✓ Pressure at high temperature;
- ✓ Heat shock;
- ✓ Cold bending / elongation test; and
- ✓ Flame resistance.

B.3.9.1.a Sampling

The necessary quantities of samples for the tests are those established in the table below:

Cable Type	Conductor class	Initial tests
		Type
Unipolar	1, 2, 4, 5 or 6	On the smallest section of the highest conductor class and on the highest section of the smallest conductor class made

B.3.9.2 Surveillance tests

At each six months will be checked the correct functioning of the spark tester, as to its obligatoriness of its use according to the conditions established in the standard NBR 9117 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests on each one of the samples taken:

- ✓ Label marking checking;
- ✓ Product marking checking;
- ✓ Conductor construction;
- ✓ Dimensional checking;
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage test;
- ✓ Insulation resistance at 20ºC

B.3.9.2.a Beyond the tests mentioned previously, must be carried out the tests as indicated below, according to the established periodicity, having as reference the grant of the license for the use of the Conformity Marking.

- ✓ 1° Semester: Pressure at high temperature test; Insulation resistance at 95ºC;
- ✓ 2° Semester: Mechanical characteristics for the insulation; Cold bending/elongation;
- ✓ 3° Semester : Flame resistance test; Heat shock test;
- ✓ 4° Semester: Long term high voltage test

B.3.10 NBR 10300:1997

B.3.10.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Construction/dimensional checkings;
- ✓ Electrical resistance at 20ºC;
- ✓ Voltage test;
- ✓ Insulation resistance at 20ºC;
- ✓ Mutual capacitance;
- ✓ Mechanical characteristics (insulation/sheath);
- ✓ Flame resistance/oxygen index/vertical flame test.
- ✓ Voltage test on cores;
- ✓ Insulation resistance at the maximum temperature of operation;
- ✓ Insulation resistance between the shields (if applicable);
- ✓ Pressure test at high temperature;
- ✓ Bending test/elongation test;
- ✓ Heat shock;
- ✓ Water absorption; and
- ✓ Cold impact test.

B.3.10.1.a Sampling

The necessary quantity of samples to have carried out the tests is indicated in the table below:

Product	Number of Elements (Pairs and Triples)	Conductor class	Voltage (V)	Type tests
Instrumentation cable	1x2 (pair)	2	300	2x2,5
Instrumentation cable	16x3 (triples)	2	300	3x0,5

Note:
(1) If the manufacturer does not make any one of the cables indicated, must be used the possible closest.
(2) In case of the manufacturer makes the cables with and without armor, must be carried out the dimensional tests on the cable of smallest number of elements and on the biggest section, with the option of armor (with/without) complementing the tested cable for type tests.
(3) The tests above must be applied for each type of insulation/sheath specified in the standard.

B.3.10.2 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as to its obligatoriness of its use according to the conditions established in the standard NBR NM 274 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests at each one of the samples taken:

- ✓ Marking checking;
- ✓ Construction/dimensional checkings;
- ✓ Electrical resistance at 20ºC;
- ✓ Voltage test;
- ✓ Insulation resistance at 20ºC; and
- ✓ Mutual capacitance.

B.3.10.2.a Beyond the mentioned tests in the previous item, it must be carried out the tests below, in accordance with the established period, having as reference the grant of the license for the use of the Conformity Marking.

✓ 1° Semester: insulation resistance at the maximum operation temperature, bending test/elongation test and cold impact test;

✓ 2° Semester: Mechanical characteristics (insulation/sheath) and heat shock (insulation and sheath);

✓ 3° Semester: Flame resistance/oxygen index/vertical flame test, insulation resistance between the shields (if applicable), pressure test at high temperature and water absorption - electrical method (insulation); and

✓ 4° Semester: Voltage test on cores.

B.3.11 IEC 60245-3:1994 + EMENDA 1997, Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 3: Heat resistant silicone insulated cables

The sale of cable in the Brazilian commerce must fulfill the requirements of the INMETRO rule nº 640/2012.

B.3.11.1 Initial tests

The initial tests are type tests established:

- ✓ **Checking of mark;**
- ✓ **Conductor construction;**
- ✓ **Dimensional checking, including ovality;**
- ✓ **Voltage test;**
- ✓ **Electrical resistance at 20ºC;**
- ✓ **Mechanical characteristics;**
- ✓ **Hot set test;**

B.3.11.1a Sampling

The necessary quantity of samples for the initial tests to be carried out is that related to the minimum and maximum section of the scope requested.

B.3.11.2 Surveillance tests

For every half yearly, the surveillance must be always carried out the following tests on each one of the sampling taken:

- ✓ **Checking of the mark;**
- ✓ **Conductor construction;**
- ✓ **Dimensional checking, including ovality;**
- ✓ **Voltage test; and**
- ✓ **Electrical resistance at 20ºC.**

B.3.11.2.a Beyond the tests mentioned in the previous item, must be carried out the tests below, as with the periodicity established, having as reference the grant for the license for the use of the Conformity Mark of TÜV Rheinland do Brasil Ltda.

- ✓ **1º Semester: Mechanical characteristics;**
- ✓ **2º Semester: Not applicable;**
- ✓ **3º Semester: Hot set test; and**
- ✓ **4º Semester: Not applicable.**

B.3.12 UNIT IEC 227-4:2002

The sale of cable in the Brazilian commerce must fulfill the requirements of the INMETRO rule nº 640/2012.

B.3.12. 1 Initial tests

The initial tests are the established type tests:

- ✓ Marking checking;
- ✓ Construction / dimensional checking (ovality);
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage test;
- ✓ Insulation resistance at 70ºC;
- ✓ Mechanical characteristics (insulation and sheath);
- ✓ Flame resistance;
- ✓ Heat shock test (insulation and sheath);
- ✓ Pressure at high temperature for insulation / sheath;
- ✓ Cold bending / elongation (insulation and sheath);
- ✓ Loss of mass (insulation and sheath);
- ✓ Cold impact;
- ✓ High voltage on cores;
- ✓ Non-contamination test.

B.3.12.1.a Sampling

The necessary quantities of samples for the test are those as indicated in the table below:

Product	N.º of cores	Conductor class	Voltage (V)	Type tests
227 IEC 10	1 or 2, 3, 4, 5,	1	300/500	On the smallest and on the highest section*
	1 or 2, 3, 4, 5,	2	300/500	On the smallest and on the highest section*
227 UNIT 10P	2	1	300/500	On the smallest and on the highest section*
	2	2	300/500	On the smallest and on the highest section*
227 UNIT 10F (Circular cable)	2, 3, 4, 5,	4 , 5 or 5A	300/500	On the smallest section of the highest conductor class and on the highest section of the smallest conductor class made *
227 UNIT 10F (Flat cable)	2	4 , 5 or 5A	300/500	On the smallest section of the highest conductor class and on the highest section of the smallest conductor class made *

Note: to use samples with the smallest number of cores on one section and with highest number of cores on the other section, when applicable

B.3.12.2 Surveillance tests

At each six months will be checked the correct functioning of the spark tester, as to its obligatoriness of its use according to the conditions established in the standard UNIT IEC 227-4 and as to its calibration in the voltage test range applied by the manufacturer. Beyond of that, must be always carried out the following type tests on each one of the samples taken:

- ✓ Marking checking;
- ✓ Construction / dimensional checking (ovality)
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage test;
- ✓ Insulation resistance at 70ºC;

B.3.12.2.a Beyond the tests mentioned previously, must be performed the tests as indicated below, according to the established periodicity, having as reference the grant of the license for the use of the Conformity Marking.

- ✓ 1° Semester: Pressure at high temperature;
- ✓ 2° Semester: Mechanical characteristics (insulation and sheath); Cold bending (insulation/sheath; Cold impact;
- ✓ 3° Semester: High voltage on cores; Flame resistance; Non-contamination for the whole cable; Heat shock test;

✓ 4° Semester: Loss of mass test.

B.3.13 IEC 60454-3-1:2002 and ABNT NBR NM 60454-3-1:2007

B.3.13.1 Initial tests

Initial tests are the type tests established:

✓ Packing and roll identification characteristics;
✓ Dimensional control;
✓ Electric strength at the room temperature;
✓ Electric strength after humid conditioning;
✓ Adhesion to steel;
✓ Adhesion to backing;
✓ Tensile strength and elongation at break;
✓ Resistance to flame or flame test;
✓ Electrolytic corrosion;
✓ Flexibility and electric breakdown;
✓ Adhesion to backing at low temperature;
✓ Shear adhesion to backing after water immersion;
✓ Thermal endurance; and
✓ Penetration at elevated temperature.

B.3.13.1.a Sampling

The quantity of samples is established in the standards.

B.3.13.2 Surveillance tests

The following tests must be always carried out on each one of the samples:

✓ Packing and roll identification characteristics;
✓ Dimensional control;
✓ Electric strength at the room temperature;
✓ Adhesion to steel;
✓ Adhesion to backing;
✓ Tensile strength and elongation at break;
✓ Resistance to flame or flame test;

B.3.13.2.a Beyond of the mentioned tests in the previous item, the tests indicated below must be carried out, according to the established periodicity, having as reference the grant of the license for the use of the Conformity Marking.

✓ 1° Semester: adhesion to backing at low temperature; electric strength after humid conditioning;
✓ 2° Semester: shear adhesion to backing after water immersion; electrolytic corrosion;
✓ 3° Semester: thermal endurance; flexibility and electric breakdown.
✓ 4° Semester: penetration at elevated temperature.

B.3.13.2.a Sampling

The samples for the surveillance tests will be of 5 rolls of each certificate.

B.3.13.3 Routine tests

The routine tests for the adhesive tapes are as established below:

✓ Packing and roll identification characteristics;
✓ Dimensional control;
✓ Electric strength at the room temperature;
✓ Adhesion to steel;
✓ Adhesion to backing;
✓ Tensile strength and elongation at break;
✓ Resistance to flame propagation or flame test;
✓ Flexibility and electric breakdown.

B.3.13.3.a Sampling
The necessary quantity is established in the standards.

B.3.14 NBR 15977:2011

B.3.14.1 Initial tests

The initial tests are the type tests established:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage test; and
- ✓ Insulation resistance at 20º C;
- ✓ Insulation resistance at 90ºC;
- ✓ Resistivity of copper test
- ✓ Flexibility
- ✓ Voltage test on cores
- ✓ Pressure test at high temperature (sheath);
- ✓ Mechanical properties (insulation and sheath);
- ✓ Loss of mass (sheath);
- ✓ Copper elongation;
- ✓ draw after aging with driver for insulation or tensile strength after aging with driver , followed by folding for insulation test (for reference only)
- ✓ Flame resistance test;
- ✓ Hot set test (insulation);
- ✓ Oil immersion (sheath);
- ✓ Bending test/ elongation at low temperature (sheath);
- ✓ Tensile test after ageing in the air bomb (insulation):
- ✓ Ozone resistance test (insulation);
- ✓ Water absorption (insulation **– gravimetric).**

B.3.14.1.a Sampling

The necessary quantity of samples to perform the tests is established in the standard NBR 15977 and it corresponds to the indicated in the table.

Cable type	**Conductor class**	**Initial tests**
		Type
Multipolar	4, 5 or 6	On the lowest section of the highest conductor class and on the highest section of the lowest conductor class made.

B.3.14.2 Surveillance tests

During the surveillance, it will be checked the correct operation of the spark test, as to its effectiveness and as to its calibration in the voltage range applied by the manufacturer, in the specified conditions by the standard NM 244.

Beyond of that, will be performed in all the surveillance, the following type tests:

- ✓ Marking checking;
- ✓ Construction checking (dimensional);
- ✓ Electrical resistance at 20ºC;
- ✓ High voltage test; and
- ✓ Insulation resistance at 20º C.

B.3.14.2.a Beyond the mentioned test above, will be performed the tests listed below, according to the periodicity established.

✓ 1º Semester: Resistivity of copper test, mechanical characteristics (insulation and sheath) , flexibility and tensile strength after aging with driver for insulation or tensile strength after aging with the driver , followed by folding for insulation test (for reference only) ;

✓ 2º Semester: Copper elongation, insulation resistance (90ºC), hot set test (insulation) and gravimetric water absorption (isolation);

✓ 3º Semester: oil immersion (sheath), voltage test on cores, bending / stretching cold (coverage) , flame resistance ; and

✓ 4º Semester: Pressure test at high temperature (sheath), loss of mass (sheath), tensile test after ageing in the air bomb (insulation) and ozone resistance (insulation).

B.3.15 ISO 6722:2006

B.3.15.1 Initial tests

The initial tests are the type tests established:

- ✓ ***Outside cable diameter;***
- ✓ ***Insulation thickness;***
- ✓ ***Conductor diameter;***
- ✓ ***Conductor resistance;***
- ✓ ***Withstand voltage;***
- ✓ ***Insulation faults (performed by the manufacturer and verified during factory inspection);***
- ✓ ***Insulation volume resistivity;***
- ✓ ***Pressure test at high temperature;***
- ✓ ***Strip force;***
- ✓ ***Winding;***
- ✓ ***Impact;***
- ✓ ***Long-term ageing, 3 000 h;***
- ✓ ***Short-term ageing, 240 h;***
- ✓ ***Thermal overload;***
- ✓ ***Shrinkage by heat;***
- ✓ ***Fluid compatibility;***
- ✓ ***Durability of cable marking;***
- ✓ ***Resistance to ozone***
- ✓ ***Resistance to hot water***
- ✓ ***Temperature and humidity cycling.***

B.3.15.1.a Sampling

Cable type	***Conductor class***	***Initial tests***
		Type
Single core	***5***	***The necessary quantities of samples for the tests are prescribed in ISO 6722: 2006 and correspond to higher and lower section of conductors of each manufactured stringing class.***

B.3.15.2 Surveillance tests

The following tests must be performed on each sample:

- ✓ ***Outside cable diameter;***
- ✓ ***Insulation thickness;***
- ✓ ***Conductor diameter;***
- ✓ ***Conductor resistance;***
- ✓ ***Withstand voltage;***
- ✓ ***Insulation volume resistivity;***

B.3.15.2.a Beyond the mentioned test above, will be performed the tests listed below, according to the periodicity established.

- ✓ ***1º Semester: Pressure test at high temperature; Strip force; Winding;***
- ✓ ***2º Semester: Impact; Short-term ageing, 240 h; Thermal overload;***
- ✓ ***3º Semester: Resistance to ozone; Resistance to hot water; Temperature and humidity cycling***
- ✓ ***4º Semester: Shrinkage by heat; Fluid compatibility; Durability of cable marking.***

B.3.16 ISO 14572:2006

B.3.16.1 Initial tests

The initial tests are the type tests established:

- ✓ ***Visual appearance;***
- ✓ ***Outside cable diameter;***
- ✓ ***Ovality of sheath;***
- ✓ ***Thickness of sheath;***
- ✓ ***Continuity;***
- ✓ ***Withstand voltage;***
- ✓ ***Screening effectiveness***
- ✓ ***Pressure test at high temperature;***
- ✓ ***Adhesion of sheath;***
- ✓ ***Cyclic bending;***
- ✓ ***Winding;***
- ✓ ***Impact;***
- ✓ ***Resistance to abrasion***
- ✓ ***Long-term ageing, 3 000 h;***
- ✓ ***Short-term ageing, 240 h;***
- ✓ ***Thermal overload;***
- ✓ ***Shrinkage by heat of sheath ;***
- ✓ ***Fluid compatibility;***
- ✓ ***Durability of sheath marking;***
- ✓ ***Resistance to ozone;***
- ✓ ***Resistance to hot water;***
- ✓ ***Temperature and humidity cycling;***
- ✓ ***Resistance to flame propagation;***
- ✓ ***Artificial weathering;***

B.3.16.1.a Sampling

Cable type	***Conductor class***	***Initial tests***
		Type
Multicore	***5***	***The necessary quantities of samples for the tests are prescribed in ISO 14572: 2006 and correspond to higher and lower section of conductors of each manufactured stringing class. Alternatively, when the joint certification cables as ISO 6722 standard, can use an intermediate section as 3x2,5mm².***

B.3.16.2 Surveillance tests

The following tests must be performed on each sample:

- ✓ ***Visual appearance;***
- ✓ ***Outside cable diameter;***
- ✓ ***Ovality of sheath;***
- ✓ ***Thickness of sheath;***
- ✓ ***Conductor resistance;***
- ✓ ***Withstand voltage;***
- ✓ ***Continuity.***

B.3.16.2.a Beyond the mentioned test above, will be performed the tests listed below, according to the periodicity established.

- ✓ ***1º Semester: Screening effectiveness; Pressure test at high temperature; Adhesion of sheath; Cyclic bending;***
- ✓ ***2º Semester: Winding; Impact; Resistance to abrasion; Short-term ageing, 240 h;***
- ✓ ***3º Semester: Resistance to ozone; Temperature and humidity cycling; Resistance to flame propagation; Artificial weathering;***
- ✓ ***4º Semester: Thermal overload; Shrinkage by heat of sheath; Fluid compatibility; Durability of sheath marking; Resistance to hot water.***

ANNEXO C – ACTION FACING THE NON CONFORMITIES

C.1 During the initial certification, eventual non conformities must be fixed, before the conclusion of the process.

C.2 Identified any non-conformity in one of the surveillance tests, this will be repeated on two new samples, counterproof and witness, for the attribute non-conform, not admitted the identification of any non-conformity.

Note: In case of TÜV Rheinland do Brasil judges relevant, and with accordance with the manufacturer, the non-conformity can be confirmed without submission of the counterproof and witness to the tests.

C.3 When the confirmation of the non-conformity, TÜV Rheinland do Brasil will suspend immediately the license for the use of the conformity mark, requesting the manufacturer the relevant treatment, with definition of the corrective actions and deadline of implementation.

Note: In case of when the non-conformity found does not put the safety of the user under risk, under analysis and responsibility of TÜV Rheinland do Brasil, the manufacturer can have their license for the use of conformity mark not suspended, since guarantee TÜV Rheinland do Brasil, through corrective actions, the correction of the non-conformity on the existing products on the market and the implementation of these actions on the line of production.

ANNEX D – CONFORMITY MARKINGS

D.1 The conformity markings to be applied on the products and on the packages are established in the items **D**.**1.1** and **D**.**1.2**.

D.1.1 When we have accreditation of INMETRO

TÜV RHEINLAND + OCP 0004 or UCIEE + OCP 0004

a) For product and package

OCP 0004

OCP 0004

b) Alternative, only for product, as note 2.

Note:

1) The mark “TUV + OCP-0004” will be granted for the scopes that are included in the voluntary annex of TÜV Rheinland do Brasil’s accreditation, with INMETRO.
The mark “UCIEE + OCP-0004” will be granted only for the customers that had already the authorization for the use of this mark and for the scopes that was covered in the voluntary annex of TUV Rheinland do Brasil’s accreditation, with INMETRO, in April of 2009.

2) In case of wires, cables and cords that by their dimensions make impossible the clear printing on the product of the Conformity Mark TUV+OCP-0004 of the item a) will be allowed the use of Mark of item b).

3) In case of wires, cables and cords, of section 2,5mm² or smaller than, because for their dimensions, make impossible the clear printing of the conformity mark of the items a) and b), will be allowed the use, written out in full, the trademark followed by its identification, i. e., “TÜV RHEINLAND DO BRASIL OCP-0004”.

4) On the product of section 1mm² or smaller, the Conformity Mark is optional, but, obligatory on the package / labels.

D.1.2 When we do not have the accreditation of INMETRO

TÜV RHEINLAND or UCIEE

c) For product and package

d) Alternative, only for product, as note 2.

Note:

1) The marking “UCIEE” will be granted only for the customers that have already the authorization for the use of this marking, and that do not want to migrate to the marking of TUV.

2) In the case of wires, cables and cords that by their dimensions make impossible the clear print on the product of the Conformity Marking TUV of the item c) will be allowed the use of the Marking of the item d).

3) In case of wires, cables and cords, of section 2,5mm² or smaller that, by their dimensions, make impossible the clear print of conformity of the items c) and d), will be allowed the use by written in full form of the name of TÜV Rheinland followed by its number of identification, i.e.:
“TÜV RHEINLAND DO BRASIL OCP-0004”.

4) On the product of section 1mm² or smaller, the Conformity Markings is optional, being, obligatory on the packages/labels.