

# ISO/IEC 10373-1

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**AMENDMENT 1**  
2012-11-01

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## Identification cards — Test methods — Part 1: General characteristics

### AMENDMENT 1

*Cartes d'identification — Méthodes d'essai —*

*Partie 1: Caractéristiques générales*

*AMENDEMENT 1*

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## Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to ISO/IEC 10373-1 was prepared by Joint Technical Committee JTC1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

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# Identification cards — Test methods —

## Part 1: General characteristics

### AMENDMENT 1

*Page 1, Normative references*

Add the following references:

ISO/IEC 7816-2, *Identification cards — Integrated circuit(s) cards with contacts — Part 2: Dimensions and location of the contacts*

IEC 60749-26, *Semiconductor devices — Mechanical and climatic test methods — Electrostatic discharge (ESD) sensitivity testing — Human body model (HBM)*

*Page 3, Terms and definitions*

Add the following terms and definitions:

**3.15**

**ICC**

integrated circuit(s) card

**3.16**

**typical protocol and application specific communication**

any communication between a DUT and the corresponding test-apparatus based on protocol and application implemented in the DUT and representing its normal use

**3.17**

**Test Scenario**

defined typical protocol and application specific communication to be used with the test methods defined in this document

**3.18**

**PICC**

Proximity integrated circuit(s) card or object

*Page 4, Clause 4*

Add the following subclauses after 4.5.

**4.6 Conventions for electrical measurements on ICCs with contacts**

Potential differences are defined with respect to the GND contact of the ICC and currents flowing to the ICC are considered positive.

**4.7 Apparatus for measurements on ICCs with contacts**

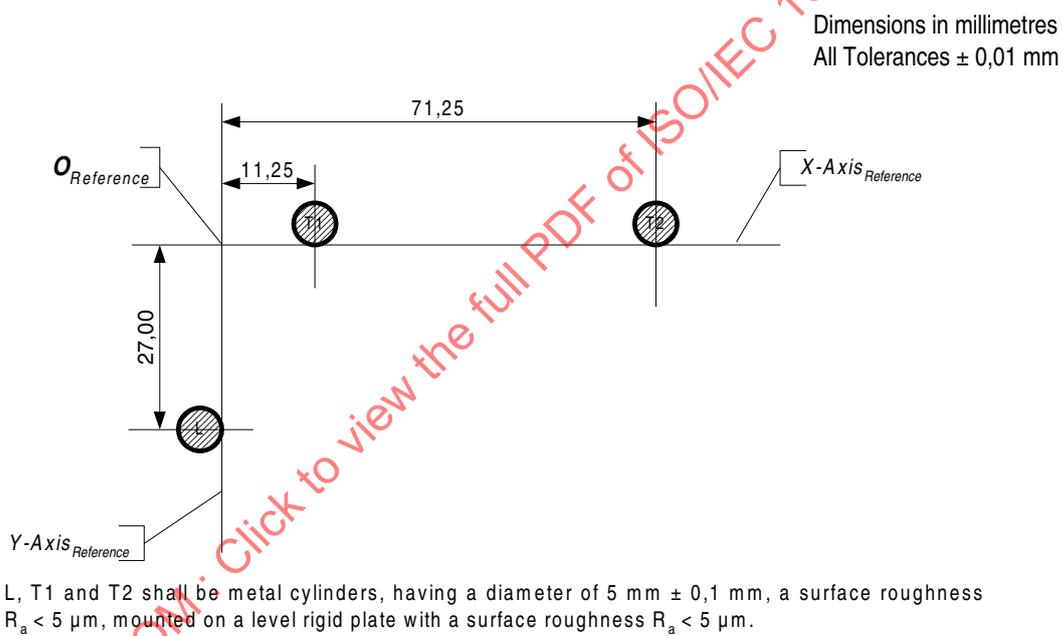
**4.7.1 Default ICC-holder, reference axes and default measurement position**

When required by the test-method, the ICC shall be positioned in the default measurement position as subsequently defined.

The default measurement position requires the ICC to be positioned in an ICC-holder and flattened by a flattening plate. All Measurements using this default measurement position shall be relative to the reference axes defined in Figure Amd.1-1.

**4.7.2 Default ICC-holder and reference axes:**

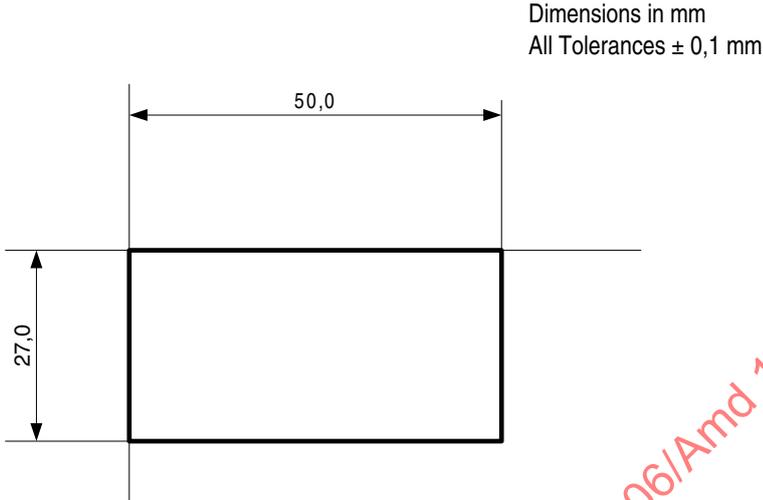
The default ICC holder shall comply with Figure Amd.1-1:



**Figure Amd.1-1 — ICC-holder**

**4.7.3 Flattening Plate**

The flattening plate shall comply with Figure Amd.1-2:

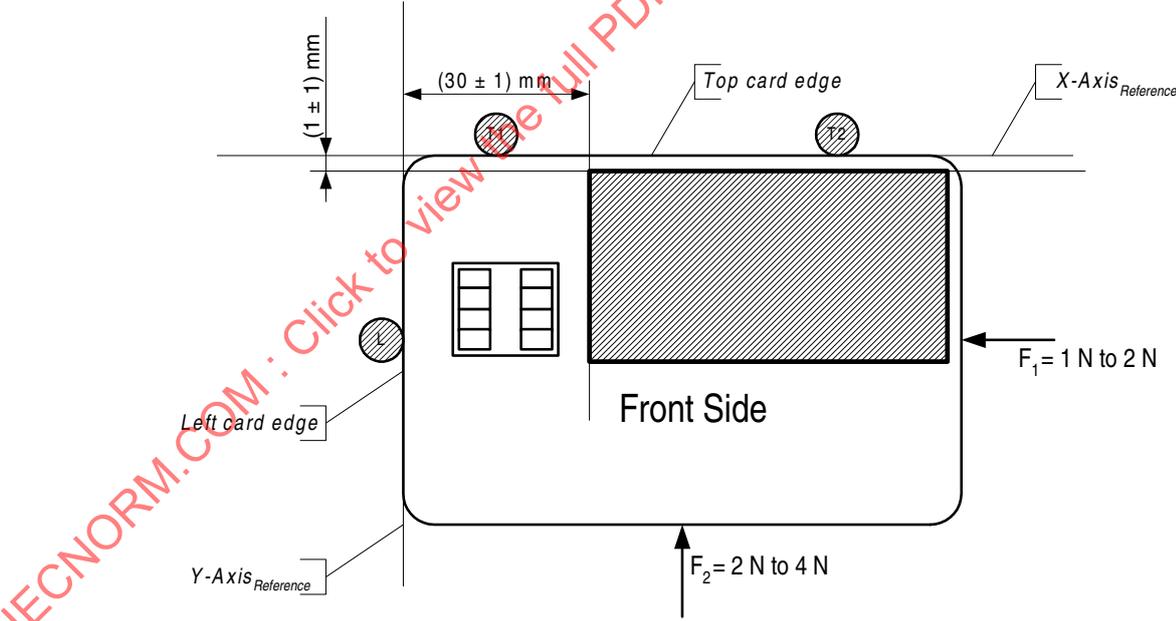


The surface roughness of the flattening plate shall be  $R_a < 5 \mu\text{m}$ .

**Figure Amd.1-2 — Flattening plate**

**4.7.4 Default Measurement Position**

The ICC and the flattening plate shall be mounted on the ICC-holder as shown in Figure Amd.1-3:



$F_1$  and  $F_2$  are forces applied to the center of the right and the bottom edge of the card respectively to fix the card in the card-holder.  
The flattening plate shall apply a force of  $2,2 \text{ N} \pm 0,2 \text{ N}$  to the surface of the card

**Figure Amd.1-3 — Position of ICC and flattening plate on ICC-holder**

Page 9, 5.4.1.1.g)

Correct the formula for ethylene glycol to HOCH<sub>2</sub>CH<sub>2</sub>OH.

Page 23, Clause 5

After 5.16, add the following subclauses:

### 5.17 Dimension and Location of Contacts for ICCs with contacts

The purpose is to determine the compliance of the dimensions and the location of the ICC's contacts with ISO/IEC 7816-2.

#### 5.17.1 Apparatus

An ICC-Holder and a flattening plate compliant with 4.7.1.

Any device capable of executing the procedure below with the defined accuracy.

#### 5.17.2 Procedure

- a) Mount the ICC in the default measurement position as defined in 4.6.1.
- b) Construct two lines parallel to the X-Axis<sub>Reference</sub> and two lines parallel to the Y-Axis<sub>Reference</sub> on the ICC surface, forming the minimum contact area C1 as defined in ISO/IEC 7816-2 with an accuracy of equal to or better than 0,01 mm.
- c) Check if the rectangular area enclosed by the four lines is completely covered by contact metallization and note the result.
- d) Check if the metallization within the rectangular area enclosed by the four lines is connected to metallization in any other minimum contact area and note the result.
- e) Repeat b) to d) for the minimum contact areas C2 to C8.

#### 5.17.3 Test report

The test report shall state for each observed minimum contact area, whether it is completely covered by contact metallization and if it is connected to metallization in any other minimum contact area.

### 5.18 Static electricity test for ICCs with contacts

IEC 60749-26 shall be used to test conformance with the static electricity requirements of the base standard.

#### 5.18.1 Test Report

The test report shall state whether or not the card under test remained testably functional following the exposure.

### 5.19 Static electricity test for proximity and vicinity ICCs

The purpose of this test is to check the behaviour of the card IC in relation to electrostatic discharge (ESD) exposure in the test sample. The PICC or VICC under test is exposed to a simulated electrostatic discharge (ESD, human body model) and its basic operation checked following the exposure.

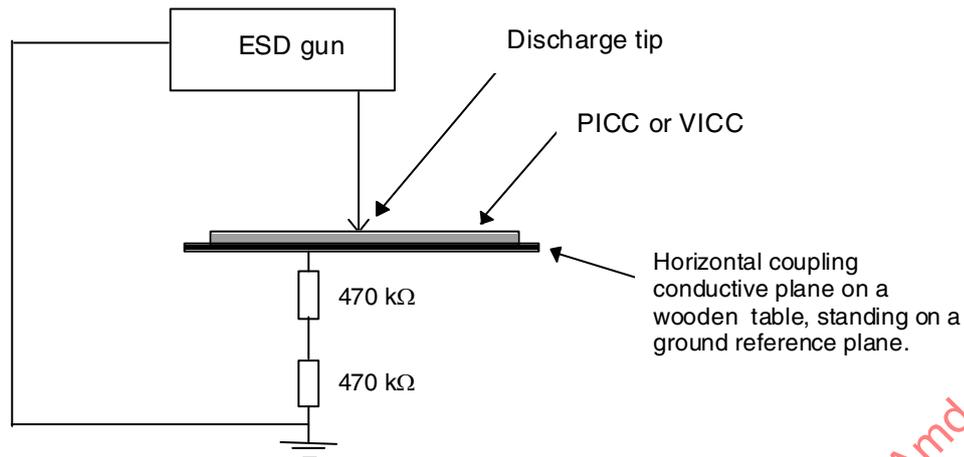


Figure Amd.1-4 — ESD test circuit

### 5.19.1 Apparatus

Refer to IEC 61000-4-2:1995.

a) Main specifications of the ESD generator:

- energy storage capacitance:  $150 \text{ pF} \pm 10 \%$ ;
- discharge resistance:  $330 \Omega \pm 10 \%$ ;
- charging resistance: between  $50 \text{ M}\Omega$  and  $100 \text{ M}\Omega$ ;
- rise time: 0,7 ns to 1 ns.

b) Selected specifications from the optional items:

- type of equipment: table top equipment;
- discharge method: direct application of air discharge to the equipment under test;
- discharge electrodes of the ESD generator: Round tip probe of 8 mm diameter.

### 5.19.2 Test procedure

Connect the ground pin of the apparatus to the conductive plate upon which the PICC or VIVV is placed (see Figure Amd.1-4).

Apply the discharge successively in normal polarity to each of the 20 test zones shown in Figure Amd.1-5 ensuring that the discharge tip is not applied within 6 mm of the card perimeter (see the dashed boundary line in Figure Amd.1-5) and allowing a cool-down period between successive pulses of at least 10 s.

Repeat the procedure with reversed polarity.

**WARNING — If the PICC or VICC includes contacts, the contacts shall face up and the zone which includes contacts shall not be exposed to this discharge.**

Check that the PICC or VICC operates as intended at the end of the test.

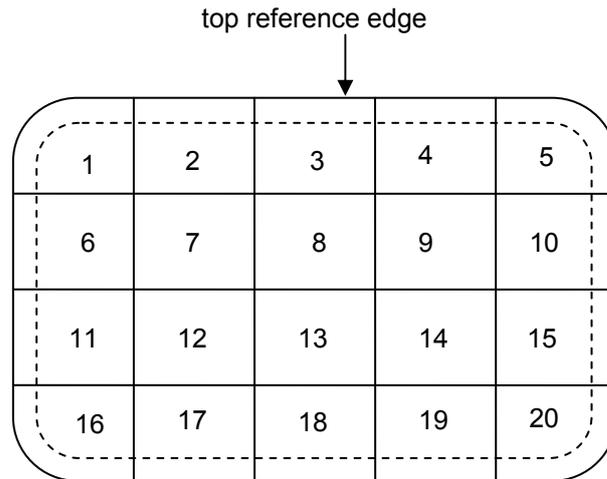


Figure Amd.1-5 — Test zones on PICC or VICC for ESD test

**5.19.3 Test report**

The test report shall state whether or not the PICC or VICC operates as intended.

**5.20 Electrical surface resistance of contacts of ICCs with contacts**

The purpose of this test is to determine the surface resistance of the ICC contact surface.

NOTE This test method supersedes the test method defined in ISO/IEC 7816-1:1998, 4.2.5.

**5.20.1 Apparatus**

Ohmmeter with a range from 10 mΩ to 2 Ω having an accuracy of ± 2 mΩ and test prods as defined in Figure Amd.1-6. The measurement current shall be less than or equal to 100 mA and the measurement voltage shall be less than or equal to 20 mV.

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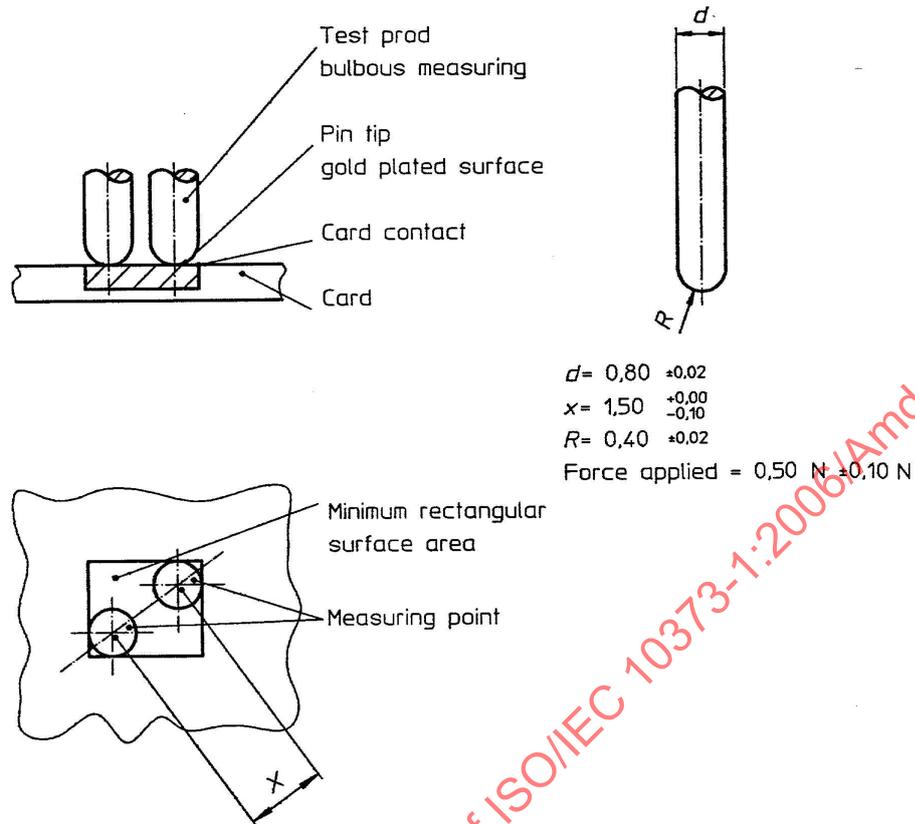


Figure Amd 1-6 — Test prods

### 5.20.2 Procedure

Place the ICC on a flat hard surface.

Apply the two test prods to each present minimum contact area as defined in ISO/IEC 7816-2.

Measure the electrical resistance between the two test-prods for each present minimum contact area.

NOTE Start applying measurement current and voltage after making the mechanical contact.

### 5.20.3 Test report

Report the resistance values for each measured minimum contact area.

### 5.20.4 Preliminary requirement

The base standard does not specify a value corresponding to this test. Until the base standard is revised, 500 mΩ shall be used as the maximum allowed surface resistance.

## 5.21 Surface profile of contacts of ICCs with contacts

The purpose is to determine the difference in thickness between the ICC's contacts and the adjacent ICC surface.

5.21.1 Apparatus

An ICC-Holder and a flattening plate conforming to 4.7.2 and 4.7.3, respectively.

A measurement device capable of measuring the perpendicular distance between the upper surface of the level rigid plate of the ICC-holder and the upper surface of an ICC placed on the ICC-holder with an accuracy of 0,01 mm. The area of measurement shall be 2,5 mm wider in all directions than the area covered by the contact metallization of the ICC to be tested. The measurement tip shall be as shown in Figure Amd.1-7:

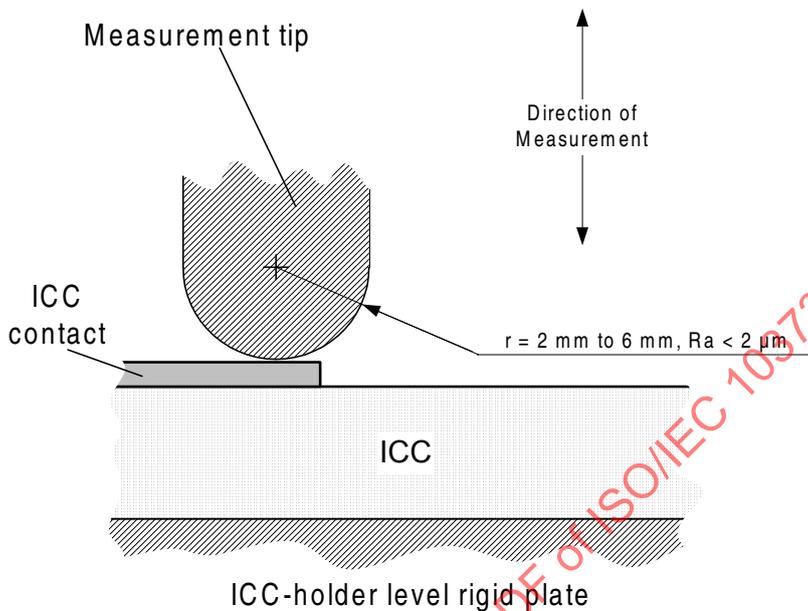


Figure Amd.1-7 — Measurement tip

5.21.2 Procedure

The positioning tolerance of the measurement tip relative to the measurement line in the procedure below shall not exceed 0,5 mm.

- a) Mount the ICC in the default measurement position as defined in 4.6.1.
- b) Construct a measurement line on the surface of the ICC along the centerline of the minimum contact areas C1 and C5, beginning and ending at a distance of 2 mm of the metallized contact surface (Figure Amd.1-8).
- c) Measure the distance between the level rigid plate and the start and endpoint of the measurement line and calculate the arithmetic average of the two distances, subsequently called 'base thickness'.
- d) Determine the minimum and maximum distance between the level rigid plate and all points on the surface of the ICC along the measurement line.
- e) Calculate the difference between the base thickness and the maximum and minimum distance determined under d) in such a way that a distance higher than the base thickness results in a positive value and a distance below in a negative.
- f) Repeat b) to e) for the centerlines of the contacts C2 and C6, C3 and C7 and, if present, C4 and C8.

g) Determine the minimum and maximum value of all values determined under e).

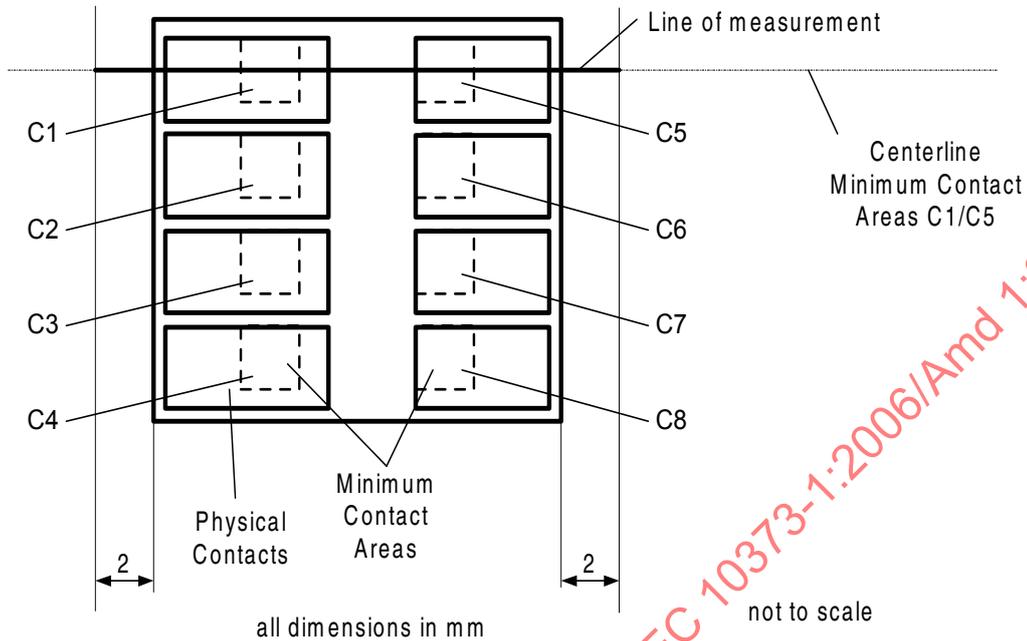


Figure Amd.1-8 — Measurement line across contacts C1 and C5

### 5.21.3 Test report

Report the minimum and maximum value determined in the procedure, step g) and the radius of the measurement tip used.

## 5.22 ICC — Mechanical strength: 3 wheel test for ICCs with contacts

The purpose of this test is to determine the mechanical reliability of an ICC by moving the ICC cyclically between three steel wheels rolling over the contact area.

NOTE This test may not be relevant for ICCs with a die area of less than 4 mm<sup>2</sup>.

### 5.22.1 Apparatus

The principle of the apparatus is shown in Figure Amd.1-9. It comprises three wheels, one above and two below the ICC. The ICC is moved cyclically between the three wheels, so that the contact area is repeatedly exposed to the forces exerted by the wheels.

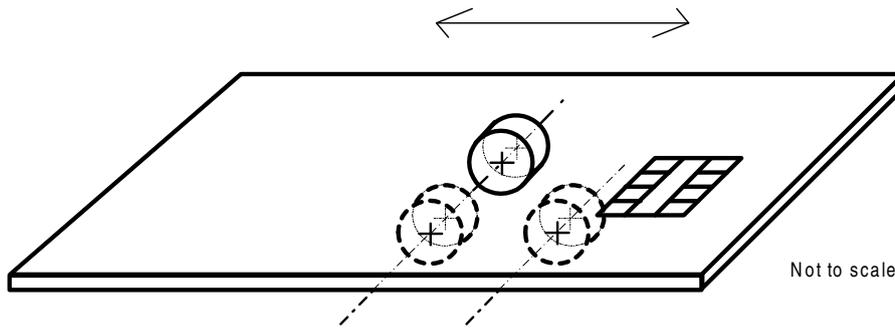


Figure Amd.1-9 — 3 wheel test principle

The apparatus shall comprise three wheels mounted as shown in Figure Amd.1-10. Wheels W2 and W3 are fixed. Wheel W1 can move in the direction perpendicular to the surface of the ICC with a maximum error of  $\pm 5^\circ$  and applies a force  $F$  as shown in Figure Amd.1-10 to the surface of the ICC. The force  $F$  shall be applied by means of a static weight (in contrast to the dynamic stress that would be applied by a spring, stepper motor or pneumatic cylinder) fixed above wheel W1 such that the force direction shall pass through the axis of wheel W1. The resulting downward movement of wheel W1 shall be limited, so that the distance between axis B in Figure Amd.1-10 and the surface of wheel W1 never becomes smaller than 3 mm.

The magnitude of the force  $F$  shall be that value defined by the base standard or, if the base standard does not define a value,  $8,0N \pm 0,5N$ .