

**MERCOSUR  
STANDARD**

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**Safety of toys  
Part 2: Flammability**



*MERCOSUR  
STANDARDIZATION  
ASSOCIATION*



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## **Foreword**

The AMN – MERCOSUR Standardization Association – aims to promote and undertake the actions towards the development and harmonization of standards under the Southern Common Market – MERCOSUR, and is comprised by the National Standardization Agencies of the member countries.

The AMN performs its standards activity by means of the CSM – MERCOSUR Sectorial Committees – Which were set up for clearly defined action fields.

The Draft MERCOSUR Standards, prepared under the CSM, are submitted to national vote through the Standards National Agencies of member countries.

The acceptance as MERCOSUR Standard through MERCOSUR Standardization Association requires consensus approval by its members.

This Standard was prepared by the CSM-4 Mercosur Sectoral Committee for Toys

The studies supporting the draft for this MERCOSUR Standard, were based on ISO 8124-2- Safety of toys. Part 2: Flammability

Within the CSM-4, this Standard was reviewed as MERCOSUR Standard draft 04:00-001-2



## Introduction

This MERCOSUR Standard is the Part 2 of the Mercosur Standard for safety of toys. It is intended to eradicate toys which expose the child to danger of fire.

This part shall be read in conjunction with the Part 1.

During the preparation of this Standard, toys in general were considered, and it was decided to consider the products defined in the field of application.

This Standard has the following parts:

- Part 1: General, mechanical and physical properties;
- Part 2: Flammability;
- Part 3: Migration of certain elements;
- Part 4: Experimental sets for chemistry and related activities;
- Part 5: Chemical toys (sets) other than experimental sets;
- Part 6: Safety of electric toys.

There is little available data on risks associated with the flammability of toys. There is considerable interest and concern on the conceptualized risks, however very little exists in terms of actual facts to prevent such risks..

Over 80% of deaths of children by fire are due to asphyxiation by fumes. This Standard however, does not address the effects of fumes. It does address the flammability of materials.

In any case, of all combustible materials surrounding a child, only a small percentage is actually toy materials. The others are household materials such as furniture, curtains, beds etc..

The objective of this part of the Standard is to address certain risks. Theoretically, all material burns, if exposed during a sufficiently long time to a source of ignition. Therefore, it was decided to address the toys that:

- a) are used as clothing for children (costumes), including specifically cloaks, loose dresses and similar articles;
- b) the child can enter, such as tents and toy houses;
- c) the child can embrace (soft stuffed toys);
- d) are worn by children, in the form of masks, wigs, etc.

The risks to be addressed in such cases stem from the direct contact between the child and the product. When ignited, the material must burn with low speed of flame, allowing the child to remove the product, or get out of the product, before serious injuries occur.



# Safety of toys

## Part 2: Flammability

### 1 Scope

**1.1** This part of MERCOSUR standard specifies the categories of flammable materials that are prohibited in all toys, and requirements concerning *flammability* of certain toys when they are subjected to a minor source of ignition.

**1.2** The test methods described in Clause 5 are used for the purposes of determining the *flammability* of toys under the particular test conditions specified. The test results thus obtained cannot be considered as providing an overall indication of the potential fire hazard of toys or materials when subjected to other sources of ignition.

**1.3** This part includes general requirements relating to all toys and specific requirements and test methods relating to the following toys, which are considered as being those presenting the greatest hazard:

- toys to be worn on the head: beards, moustaches, wigs, etc., made from *hair*, pile or material with similar features;
- costumes (for example, fancy dresses, cowboy clothes, nurse clothing), including its parts worn on the head, and toys to be dressed by a child (excluding products covered in 4.2, and paper hats or similar items in surprise packages);
- toys in which the child can enter (for example, tents, puppet theatres, puppets, Indian tents);
- Flexible stuffed toys with soft plush or textiles surfaces, excluding dolls with non rigid bodies in which the head and limbs are entirely made of non textile polymeric material.

NOTE 1 – Additional requirements regarding the flammability of electric toys are specified in Part 6- Safety of electric toys, of the MERCOSUR Standard.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute requirements of this part of MERCOSUR Standard. The indicated editions were valid at the time of publication of this Standard. As every standard is subject to reviews, parties entering agreements based on this MERCOSUR Standard are encouraged to investigate the possibility of using the most recent editions of the normative documents listed below. Normative Agencies of member countries maintain updated information on latest editions at all times. NM 300–1:2002 – Safety of toys – Part 1: General, mechanical and physical properties

NM 300–5:2002 – Safety of toys – Part 5: Chemical toys (sets) other than experimental sets

NM 300–6:2002 – Safety of toys – Part 6: Safety of electric toys

ISO 2431:1993 – Paints and varnishes – Determination of flow time by use of flow cups



### 3 Definitions

For the purposes of this part of MERCOSUR standard, the following terms and definitions apply.

#### 3.1

**flammability**

ability of a material or a product to burn producing a flame under specified test conditions

#### 3.2

**flaming debris**

material that becomes detached from the sample during the test procedure and continues to burn as it falls

#### 3.3

**self-extinguishable**

the representative sample ignites, but subsequently it is extinguished before the second wire marker is cut (see 4.4)

#### 3.4

**representative sample**

Each individual sample as it appears in the toy. When there is not sufficient amount of material to produce a specimen of 80 mm x 600 mm, this material shall not be tested

#### 3.5

**hair**

slender flexible fibers intended to represent *hair* (see 4.2)

#### 3.6

**Flexible stuffed toy**

toys with body surfaces composed of flexible or plush material, filled with flexible material (such as grains of expanded polystyrene, polyester fiber or polyurethane foam) to allow easy compression of the body with the hand. They include toys with and without clothes.

#### 3.7

**surface flash**

rapid spread of flame over the surface of a material without ignition of its base structure at the same time

### 4 Requirements

#### 4.1 General

The following materials shall not be used in the manufacture of toys.

- a) celluloid (cellulose nitrate) and materials that have a similar behavior in fire (except when used in varnish or paint);
- b) Plush materials that produce surface flash when exposed to a flame.

Moreover, toys shall not contain flammable gases, highly or extremely flammable liquids, and flammable solids, except:

- a) flammable liquids, supplied in sealed containers having a maximum volume of 15 ml per container;
- b) highly flammable liquids and flammable liquids entirely contained within a porous material or in capillary channels of writing instruments;



- c) flammable liquids with a viscosity greater than  $260 \times 10^{-6} \text{ m}^2/\text{s}$  corresponding to a flow time of more than 38 s when determined in accordance with ISO 2431 using a No. 6 cup.
- d) highly flammable liquids contained in products specified in Part 5 of this MERCOSUR Standard.

#### **4.2 Beards, moustaches, wigs, masks and other products worn on the head containing hairs or similar materials**

**4.2.1** Beards, moustaches, wigs, masks and other products worn on the head containing hair, hair like materials, cloth strips, paper strips or paper cords, hairy elements, in which the length of above mentioned materials is equal or larger than 50 mm, such materials shall have a flame persistence of no more than 2s when tested according to 5.5.

In addition, if ignition occurs, the largest length of hair or other unburnt materials or accessories shall be:

- a) more than 50 % of the greatest initial length, when the initial length was 150 mm or more;
- b) more than 25 % of the greatest initial length, when the initial length was less than 150 mm.

For wavy or curly hair, the length shall be measured with the hair stretched smooth. The article shall be tested under the least favorable conditions, for example with undone braids.

**4.2.2** Beards, moustaches, wigs, masks and other products worn on the head containing hair, hair like materials, cloth strips, paper strips or paper cords, other than the material to which they are attached to, and in which the apparent length of above mentioned materials is smaller than 50 mm, such materials shall have a flame persistence of no more than 2s (after removing the flame source) when tested according with 5.6. Besides this, the maximum dimension of the burned surface shall be smaller than 70 mm, measured from the point of flame application. Partial masks made of paperboard without hairs or plush materials (except the means used to attach the toy to the face) whose distance from the center of the eyes to the uppermost part of the mask is smaller than 130 mm are excluded..

#### **4.3 Costumes, including associated pieces to be worn on the head, and other toys to be worn by children(excluding products indicated in 4.2 and paper hats)**

When these toys are tested in accordance with 5.7, the flame rate of propagation shall be less than or equal to 30 mm/s.

If the rate of propagation of the flame is between 10 mm / s to 30 mm / s, both the toy the packaging must be marked with the following warning:

**"CAUTION! KEEP AWAY FROM FIRE"**

#### **4.4 Toys intended to be entered by a child**

When representative samples of toys are tested in accordance with 5.7, flame propagation rate shall be less or equal to 30 mm / s.

If the representative sample has a flame propagation rate of more than 20 mm / s, flaming fragments shall not disperse. (see 3.2).

If the representative sample is self-extinguishable (see 3.3), the sample is compliant with the requirement.

If the flame propagation rate is between 10 mm / s and 30 mm / s, both the toy and the package must be marked with the following warning:

**"CAUTION! KEEP AWAY FROM FIRE"**

#### **4.5 Soft stuffed toys**



The requirements for this section shall not apply to toys with maximum dimensions equal or smaller than 150 mm .

Soft stuffed toys ((animals, dolls, etc., excluding, however, dolls with heads and limbs made of non textile polymer materials) with a plush surface, or textile surface, may not have a flame propagation rate of more than 30 mm/s on its surface, during test described in 5.8. must not have a speed of spread of flame on the surface greater than 30 mm / s, during the test described in 5.8.

The toy shall be tested in the way it is available for marketing, including all the clothes that are supplied with the toy, and if applicable, with the clothes removed, if the removal can be done without damage to clothes or toys.

## **5 Test methods**

### **5.1 General**

When there is insufficient material to extract a complete sample to be tested (80 mm x 600 mm) this material is not tested. The requirements in 5.2 to 5.4 apply to test methods described in 5.5 to 5.8.

### **5.2 Conditioning and the test chamber**

**5.2.1** Before each test, toys or samples must be conditioned for at least 7 h at a temperature of  $(20 \pm 5)^\circ\text{C}$  and a relative humidity of  $(65 \pm 5)\%$ .

**5.2.2** To ensure the safety of staff and good testing practices, the tests shall be performed in a test chamber where air movement is less than 0.2m/s at the beginning of the test and that is unaffected by the functioning of mechanical equipment during the test. It is essential that the air volume within the chamber is not affected by a reduction in the oxygen concentration. If the test is carried out in a open chamber, the sample must be at least 300 mm from the walls. The temperature in the chamber shall be kept between  $10^\circ\text{C}$  and  $30^\circ\text{C}$  and relative humidity must be between 15% and 80%.

**5.2.3** Test the samples within 2 minutes after removal from conditioning atmosphere

### **5.3 Test flame**

The test flame is obtained from a burner as described in Annex A using butane gas or propane, as appropriate. The height of the flame is measured with the burner upright, from the end of the burner to the tip of the flame.

### **5.4 Pre-treatment for costumes and toys where the child enters**

**5.4.1** Each test must be performed in a new toy as provided for marketing or a sample obtained from such toys. If the Manufacturer:

- a) indicate that the toy shall not be washed, it shall not be washed or wet before the test;
- b) recommends a method for washing or cleaning, the toy shall be treated in accordance with these recommendations before the test;
- c) does not give any information related to washing or cleaning, toys shall be treated, before the test, as follows:

**5.4.2** Immerse the toy in a container filled with at least 20 times the toy mass with water at  $20^\circ\text{C}$ , and let the toy soak for 10 min.



Drain water and repeat the procedure twice. Rinse by placing the toy in demineralized water for 2 min. Let the toy drain and dry by an appropriate method for the type of toy and in case of plush or hairs, restore them as much as possible to the original appearance.

### **5.5 Test on beards, moustaches, wigs, masks and other products used in the head containing hair or other accessories that have length greater than 50 mm from the surface of the product**

**5.5.1** Measure the length of the plush, hair or other accessories. Positioning the toy so that the greater length of the plush, hair or other accessory is upright or in a position as close to vertical as possible.

**5.5.2** With the burner in a vertical position, apply a test flame with a height of  $(20 \pm 2)$  mm for 2 s on the lowest edge of the plush, hair or other accessory of the toy, so the flame penetrates the element by 10 mm, approximately.

**5.5.3** If the burning occurs, measure time of flame persistence, and the smallest length of unburned portion of plush, hair or other material.

### **5.6 Test on beards, moustaches, wigs, masks and other products used in the head containing hair or other accessories that have free lengths of less than 50 mm**

**5.6.1** Position the toy vertically.

**5.6.2** With the height of the flame of  $(20 \pm 2)$  mm determined in vertical position, place the burner at an angle of  $45^\circ$  and apply the flame to the toy for 5 s so that the flame contacts at least 20 mm above the bottom edge, and the distance between the center of the end of the burner and the surface of the toy is  $(5 \pm 1)$  mm).

**5.6.3** If burning occurs, measure flame persistence time and the maximum vertical distance separating the upper edge of the burned surface and the point of flame application.

### **5.7 Test on costumes and the toys where the child enters**

**5.7.1** Cut a representative sample of the toy and test it in the same relative position where it was in the toy (for example, along the leg of a pair of a pair of pants when the child is standing)

**5.7.2** The support for the sample consists of two U shaped metal plates with internal measures of 600 mm x 80 mm. Extend the sample along the first plate, place the second plate on top and clip them together in order to hold the sample in place. Cut any excess of the sample at the ends of the support, so that the ends of the sample and support are aligned (see Figure 1). The second or upper plate has attachment points located at 50 mm and 550mm from the open end.

**5.7.3** Clamp the end of a 100% cotton yarn (white mercerized cotton yarn with a linear density of 50 tex) to one of the points of attachment, then tense through the sample until the other point of attachment fixing a device to indicate when the wire is cut. Repeat the procedure in the second attachment point with one second wire marker.

NOTE 2 – It is possible to use a direct connection to a stopwatch or a visual indication such as weights that fall when the flame cuts the yarns.

**5.7.4** The yarn shall be less than 2 mm from the surface the sample.

**5.7.5** Place the support with the sample at  $(45 \pm 1)^\circ$  from the horizontal.

**5.7.6** With the burner in a vertical position, apply test flames  $(40 \pm 3)$  mm at the edge of sample so that the distance between the border and top of the burner is  $(30 \pm 2)$  mm. Apply the flame for  $(10 \pm 1)$  s to the most flammable material, as determined previously.

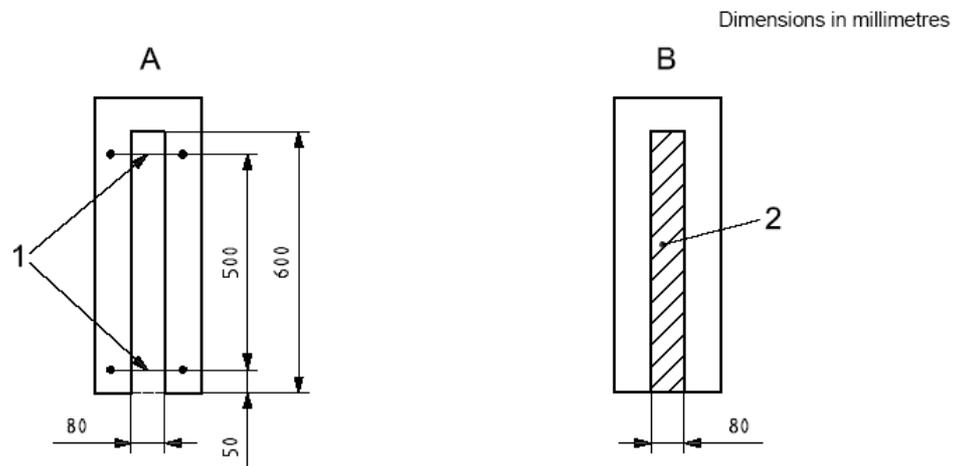


5.7.7 Observe if flash occurs on the surface.

5.7.8 To determine the rate of flame propagation, measure elapsed time between the burn out of the first reference yarn and the second one..

5.7.9 If the material does not ignite in  $(10 \pm 1)$  s, discontinue the test, and the sample is considered compliant.

5.7.10 If the surface material has not identical on both sides, test both sides.



**Key**

A top side

B underside

1 100 % mercerized white cotton marker threads

2 sample

**Figure 1 — Test for costumes and toys where the child can enter**

## 5.8 Test for soft stuffed toys

5.8.1 Positioning the toy vertically, that is, with the head as the highest position.

NOTE 3 – If more than one direction is possible, choose the less favorable position.

5.8.2 With the burner at  $45^\circ$ , apply a test flame  $(20 \pm 2)$  mm high on toy for 3 s, so that the distance between the edge the burner and the toy is approximately 5 mm and the flame contacts the toy between 20 mm and 50 mm above the bottom edge of the more flammable material, as determined above.

5.8.3 After removing the flame, measure the time elapsed for the flame to reach the top end of the toy.



## Attachment A (normative)

### Description and construction of burner<sup>1)</sup>

#### A.1 Description

The burner provides a flame in appropriate size , with adjustable height of 10 mm up to 60 mm.

#### A.2 Construction

The construction of the burner is presented in Figure A.1 (a). The burner consists of the three following parts.

##### A.2.1 Gas injector

The diameter of the orifice of the gas injector [see Figure A.1 (b)] shall be  $0.19 \text{ mm} \pm 0.02 \text{ mm}$ .

The hole must be drilled and, after this operation, all burrs are to be eliminated in both the ends, and the hole edges are not to be rounded.

##### A.2.2 Burner tube

This tube [see Figure A.1 (d)] has four zones:

- 1) air chamber;
- 2) gas mixture zone;
- 3) diffusion zone;
- 4) gas output.

Inside the air chamber, the burner tube has four holes for the air admission with 4 mm in diameter. The front end of the holes for air admission is located approximately in the level of the tip of the injector.

The diffusion zone is conically shaped and has the measures shown in Figure A.1 (d). The burner has a passage of 1.7 mm in internal diameter and output internal diameter of 3.0 mm.

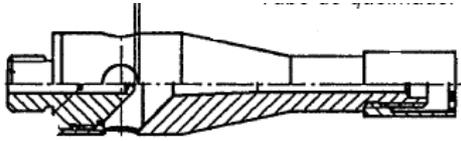
<sup>1)</sup> The burner can be obtained from: Dr. Ing Georg Wazau, Mess und Prüftechnik, Keplerstr. 12, D-1000 Berlin 10, Germany



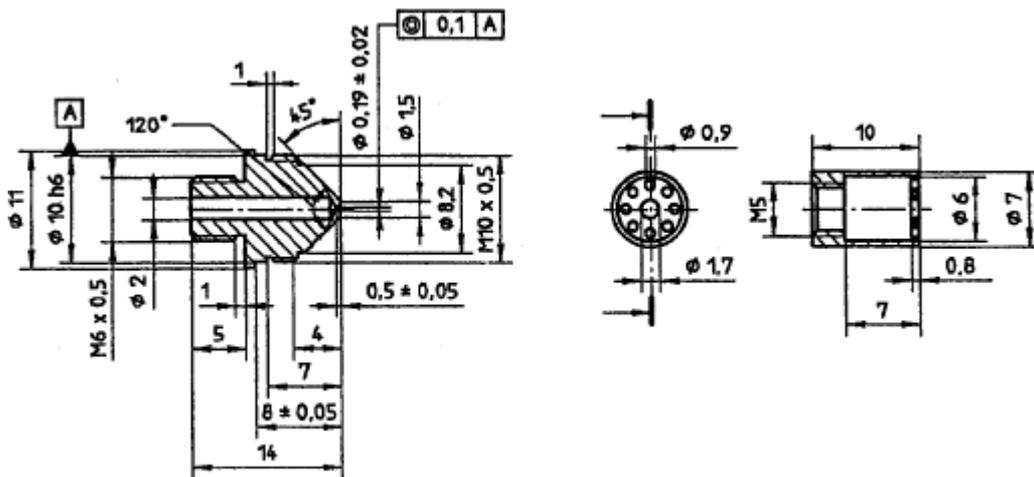
### A.2.3 Flame stabilizer

The flame stabilizer is shown on Figure A.1 c).

Dimensions in millimetres

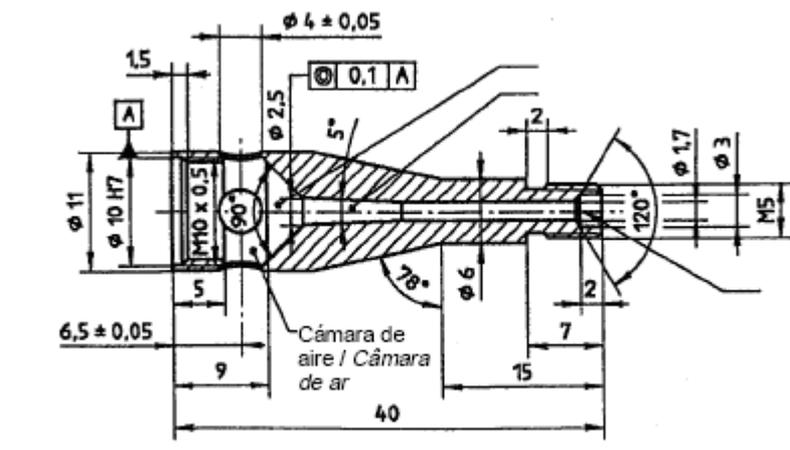


a) Gas burner arrangement



b) Gas injector

c) Flame stabilizer



d) Burner tube

Figure A.1 — Gas burner



## **Attachment B** (informative)

### **References**

For the study supporting this Standard the following documents were consulted:

**ISO - INTERNATIONAL ORGANIZATION FOR STANDARDIZATION** ISO 8124-2:1994 - Safety of toys. Flammability.

**AENOR - ASOCIACIÓN ESPAÑOLA DE NORMALIZACIÓN Y CERTIFICACIÓN** UNE-EN 71-2:1994 - Seguridad de los juguetes. Inflamabilidad.

**COPANT - COMISIÓN PANAMERICANA DE NORMAS TÉCNICAS** COPANT 1657 Parte 2:1997 - Seguridad de los juguetes. Inflamabilidad.



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**ICS 97.190.00; 97.200.50**

**Descriptors:** toys, prevention of accidents, safety, safety against fire, specifications, safety requirements, flammability, testing, flammability test

**Number of pages:** 11

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**Synthesis of the study phase**  
**MERCOSUR Standard project 04:00-01-2**  
**Safety of toys. Part 2: Flammability**

## **1 INTRODUCTION**

This part of this MERCOSUR Standard establishes the categories of flammable materials forbidden for use in all toys and the requirements concerning flammability of certain toys when they are subjected to a small ignition source.

This MERCOSUR Standard was developed by CSM 04 - Sectoral Mercosur Committee for Toys.

The base text for the MERCOSUR Standard 04:00-01-4 draft was prepared by (IRAM) in Argentina

## **2 SPECIALIZED COMMITTEE**

This Standard was prepared by CSM 04 – Toys, and the Technical Secretary of CSM 04 was performed by IRAM.

The active members that participated in the preparation of this document were:

ABNT – Associação Brasileira de Normas Técnicas

INTN – Instituto Nacional de Tecnología y Normalización

IRAM – Instituto Argentino de Normalización

UNIT – Instituto Uruguayo de Normas Técnicas

## **3 PREVIOUS HISTORY**

### **ISO – INTERNATIONAL ORGANIZATION FOR STANDARDIZATION**

ISO 8124-2:1994 –Safety of toys. Flammability

### **AENOR- ASOCIACIÓN ESPAÑOLA DE NORMALIZACIÓN Y CERTIFICACIÓN**

UNE-EN 71-2:1994 - Seguridad de los juguetes. Inflamabilidad

### **COPANT- COMISIÓN PANAMERICANA DE NORMAS TÉCNICAS**

COPANT 1657 Parte 2: 1997 – Seguridad de los juguetes. Inflamabilidad

## **4 CONSIDERATIONS**



The base text for the MERCOSUR Standard 04:00-01-2 was prepared by Argentina, based on the ISO 8124-2:1994.

It was submitted to the standardization agencies of the MERCOSUR member countries on September 17, 2001, for analysis by the Study Committees.

The draft was discussed in the technical meeting carried out in Buenos Ayres from October 29th to October 31<sup>st</sup>, 2001, in which form changes were made, and approved as a MERCOSUR Standard Draft.

It was submitted to vote in the CSM 04 in the period of 01/01/2002 to 03/31/2002.

During the voting period, approving vote was received from IRAM (Argentina) with observations regarding form, which were accepted and incorporated to the draft. Approval vote was received from ABNT (Brazil) without observations, while UNIT (Uruguay) and INTN (Paraguay) refrained from voting.

Thus, the Draft was approved as Proposed MERCOSUR Standard.

The Draft was sent to AMN, according to the established in the MERCOSUR Standard Elaboration Procedures, for edition and approval as MERCOSUR Standard NM 300-6, in November, 2002.

*The present document was translated into English and revised by independent translators.*



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