

## CLASSIFICATION OF REACTION TO FIRE IN ACCORDANCE WITH UNE-EN 13501-1:2019

D/F  
Page 1 of 12

Sponsor: **ALUCOIL, S.A.**  
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(Burgos)



Tests marked with (\*) are  
not covered by the ENAC  
accreditation.

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Product name: **LARSON FR**

Classification report nº: **21/32305614-2 M2**

Date of issue: **30<sup>th</sup> June, 2023**

**Description of the modification:** At the request of the petitioner, it is modified the classification report in order to carry out the following modifications:

- Explain in more detail the description of the system assembly (Vertical riveted installation system).
- Extend a new type of metallic sheet (In section 4.3 - field of application).
- Include another commercial name of paint finishes (In section 4.3 - field of application).
- Update the paint finishes with the results obtained with the most recent test results (In section 4.3 - field of application).
- Include new elements in fixing systems (In section 4.3 - field of application).
- Include the SIGNI products range (In section 4.3 - field of application).

The changes are shown in italics.

The present report supersedes the classification report 22/32305614-2 M1 that was issued on 18<sup>th</sup> July, 2022. It is responsibility of the client to replace the original and all the copies.

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## **1.-INTRODUCTION**

This classification report defines the classification assigned to LARSON FR in accordance with the procedures given in the UNE-EN 13501-1:2019 standard.

## **2.- DETAILS OF CLASSIFIED PRODUCT**

### **2.1.-General**

The product, LARSON FR, is defined as panels with facings of aluminium sheets and composite core.

### **2.2.-Product description**

Commercial reference of the product: LARSON FR

Composite Panel composed of two aluminium sheets bonded by means of a mineral FR core, lacquered by one face with HQPE.

#### **SAMPLE Nº1 – 303 FR**

The product is composed of 5 layers:

- Layer 1: Aluminium, 0.3 mm thick, density of 2720 kg/m<sup>3</sup>, grey pearl dark 9023 HQ2M10 colour and smooth appearance.  
Reference of the finished: HQPE, 23 µm/m<sup>2</sup> of paint applied, 1 layer, 70 g/m<sup>2</sup> of weight and dried extract of 47.5 g/m<sup>2</sup>.
- Layer 2: Glue, 0.05 mm thick, density of 938 kg/m<sup>3</sup>, transparent colour and smooth appearance.
- Layer 3: Mineral Fire retardant core, 2.4 mm thick, density of 1650 kg/m<sup>3</sup>, white colour and rugous appearance.
- Layer 4: Glue, 0.05 mm thick, density of 938 kg/m<sup>3</sup>, transparent colour and smooth appearance.
- Layer 5: Aluminium, 0.3 mm thick, density 2720 kg/m<sup>3</sup>, green colour and smooth appearance.

**SAMPLE Nº1 – 605 FR**

The product is composed of 5 layers:

- Layer 1: Aluminium, 0.5 mm thick, density of 2720 kg/m<sup>3</sup>, smoke colour and smooth appearance.  
Reference of the finished: HQPE, 23 µm/m<sup>2</sup> of paint applied, 1 layer, 70 g/m<sup>2</sup> of weight and dried extract of 47.5 g/m<sup>2</sup>.
- Layer 2: Glue, 0.05 mm thick, density of 938 kg/m<sup>3</sup>, transparent colour and smooth appearance.
- Layer 3: Mineral Fire retardant core, 5 mm thick, density of 1650 kg/m<sup>3</sup>, white colour and rugous appearance.
- Layer 4: Glue, 0.05 mm thick, density of 938 kg/m<sup>3</sup>, transparent colour and smooth appearance.
- Layer 5: Aluminium, 0.5 mm thick, density 2720 kg/m<sup>3</sup>, green colour and smooth appearance.

**SAMPLE Nº3 (Indicative sample) – LARSON FR 303+HASHTAG\***

Product trade name: **LARSON FR 303+HASHTAG\***

**Larson FR range HASHTAG finish. Larson FR range covers from 303 FR until 605 FR**

*Applus internal code: 23/14735*

*Description of the product:*

*Hashtag finish is a digital printing, that can be since 75 µm until 120 µm. It can be applied on a paint or on a primer. If it is talked about paint, it concerns to HQPE quality paint, with a maximum thickness of application of 40 µm. Normally, the range of application is between 20 – 40 µm. In the case of primer, which is called PRIMER DUROLAC (Primer D), the micronage varies between 5 and 20 microns.*

*Technical details of the sample:*

- *Layer nº1: Digital printing (UV- curable Organics inks + mix acrylic clear coat) with a thickness range of application of 75 – 120 µm (120 µm was the quantity applied for testing), with a density of 1083,33 kg/m<sup>3</sup> (It has been calculated with the values of thickness and superficial density), a superficial density of 0,13 kg/m<sup>2</sup> and smooth appearance.*

- *Layer nº2: HQPE paint (Polyester) with a thickness range of application of 20 – 40 µm (40 µm was the quantity applied for testing), with a density of 1900 kg/m<sup>3</sup> (It has been calculated with the values of thickness and superficial density), a superficial density of 0,076 kg/m<sup>2</sup>, white colour and smooth appearance.*
- *Layer nº3: Aluminium with a thickness of 0,3mm, a density of 2700 kg/m<sup>3</sup> and a superficial density of 0,076 kg/m<sup>2</sup> (It has been calculated with the values of thickness and density provided by the petitioner), aluminium colour and smooth appearance.*
- *Layer nº4: Glue, 0.05 mm thick, density of 938 kg/m<sup>3</sup>, transparent colour and smooth appearance.*
- *Layer nº5: FR core (Fire retardant) with the thickness of 2,4 mm, a density of 1640 kg/m<sup>3</sup>, a superficial density of 4,92 kg/m<sup>2</sup> (It has been calculated with the values of thickness and density provided by the petitioner), white colour and smooth appearance.*
- *Layer nº6: Glue, 0.05 mm thick, density of 938 kg/m<sup>3</sup>, transparent colour and smooth appearance.*
- *Layer nº7: Aluminium with a thickness of 0,3mm, a density of 2700 kg/m<sup>3</sup> and a superficial density of 0,076 kg/m<sup>2</sup> (It has been calculated with the values of thickness and density provided by the petitioner), aluminium colour and smooth appearance.*

Fixing system: *The three samples* were fixed to the standard substrate (calcium silicate board according to UNE-EN 13238:2011) with screws.

Installation system: Vertical riveted

*Vertical riveted installation system performed in the three samples, it is made up of the following elements:*

- *Brackets: LCH-2 90mm length bracket in aluminium EN AW 1050A H24. Mechanically fixed to standard substrate (calcium silicate board according to UNE-EN 13238:2011) through hexagonal head screw DIN 933 M8x50mm, DIN 125 M8 washer and DIN 934 M8 hexagonal nut (one per LCH-2 bracket), all 8.8 galvanized steel quality.*
- *Vertical profiles: LCH-1 in aluminium EN AW 6060 T66, fixed to brackets through hexagonal head screw DIN 933 M8x80mm, DIN 125 M8 washer and DIN 934 M8 hexagonal nut, all 8.8 galvanized steel quality (one screw per LCH-2 bracket).*

- *LARSON FR panels: machined without edge special solution (sharp cutting). Panels are fixed to vertical profiles through Al/A2 large head ( $\varnothing_k = 14\text{mm}$ ) blind rivets  $\varnothing 5'0 \times 12\text{mm}$ . Panel must have rivet holes pre-dilled before in-site installation. Every panel has at least three fixed points (three  $\varnothing 5'1\text{mm}$  holes) to avoid panel in-plane rotation. The rest of holes must have larger diameter ( $\varnothing 8'5\text{mm}$ ) to allow panel dilation under temperature increasement.*

Manufacturer: Alucoil, S.A. Address: Pol. Ind Bayas, C/ Ircio, Parc. R72-R77 – 09200 Miranda de Ebro (Burgos).

### **3.-REPORT AND RESULTS IN SUPPORT OF THIS CLASSIFICATION**

#### **3.1- Reports**

| <b>Name of Laboratory</b> | <b>Name of sponsor</b> | <b>Report ref. no.</b>  | <b>Test method and date</b>                   |
|---------------------------|------------------------|-------------------------|-----------------------------------------------|
| Applus – LGAI             | ALUCOIL, S.A.          | 17/15103-1906 M3 Part 1 | UNE-EN ISO 11925-2:2011<br>29-08-2017         |
|                           |                        |                         | UNE-EN<br>13823:2012+A1:2016<br>29-08-2017    |
|                           |                        |                         | <i>UNE-EN 13823:2021</i><br><i>09-05-2023</i> |

### 3.2- Results of the Tests

| Test Method                | RESULTS – 303 FR                                  |          |                |            |
|----------------------------|---------------------------------------------------|----------|----------------|------------|
|                            | CRITERIA CLASS B                                  | Nº TESTS | MEAN VALUE     | COMPLIANCE |
| UNE-EN-ISO 11925-2:2011    | $F_s \leq 150$ mm within 60 s                     | 24       | $F_s < 150$ mm | YES        |
| UNE-EN 13823:2012 +A1:2016 | $FIGRA_{0.2 \text{ MJ}} \leq 120$ W/s             | 3        | 17.12          | YES        |
|                            | LFS < edge of the sample                          | 3        | < to edge      | YES        |
|                            | $THR_{600s} \leq 7.5$ MJ                          | 3        | 1.70           | YES        |
|                            | CRITERIA subclass 's1'                            | Nº TESTS | MEAN VALUE     | COMPLIANCE |
|                            | $SMOGRA \leq 30$ m <sup>2</sup> /s <sup>2</sup>   | 3        | 2.14           | YES        |
|                            | $TSP_{600s} \leq 50$ m <sup>2</sup>               | 3        | 42.68          | YES        |
|                            | CRITERIA subclass 'd0'                            | Nº TESTS | MEAN VALUE     | COMPLIANCE |
|                            | Fall of droplets/particles in flames within 600 s | 3        | NO             | YES        |

| Test Method                | RESULTS – 605 FR                                  |          |                |            |
|----------------------------|---------------------------------------------------|----------|----------------|------------|
|                            | CRITERIA CLASS B                                  | Nº TESTS | MEAN VALUE     | COMPLIANCE |
| UNE-EN-ISO 11925-2:2011    | $F_s \leq 150$ mm within 60 s                     | 24       | $F_s < 150$ mm | YES        |
| UNE-EN 13823:2012 +A1:2016 | $FIGRA_{0.2 \text{ MJ}} \leq 120$ W/s             | 3        | 10.37          | YES        |
|                            | LFS < edge of the sample                          | 3        | < to edge      | YES        |
|                            | $THR_{600s} \leq 7.5$ MJ                          | 3        | 0.52           | YES        |
|                            | CRITERIA subclass 's1'                            | Nº TESTS | MEAN VALUE     | COMPLIANCE |
|                            | $SMOGRA \leq 30$ m <sup>2</sup> /s <sup>2</sup>   | 3        | 0.00           | YES        |
|                            | $TSP_{600s} \leq 50$ m <sup>2</sup>               | 3        | 31.14          | YES        |
|                            | CRITERIA subclass 'd0'                            | Nº TESTS | MEAN VALUE     | COMPLIANCE |
|                            | Fall of droplets/particles in flames within 600 s | 3        | NO             | YES        |

| <b>Test Method</b>       | <b>RESULTS – LARSON FR 303+HASHTAG*</b>                   |                 |                     |                   |
|--------------------------|-----------------------------------------------------------|-----------------|---------------------|-------------------|
|                          | <b>CRITERIA CLASS B</b>                                   | <b>Nº TESTS</b> | <b>MEAN VALUE</b>   | <b>COMPLIANCE</b> |
| <b>UNE-EN 13823:2023</b> | <i>FIGRA<sub>0.2 MJ</sub> ≤ 120 W/s</i>                   | <i>1</i>        | <i>30.06</i>        | <b>YES</b>        |
|                          | <i>LFS &lt; edge of the sample</i>                        | <i>1</i>        | <i>&lt; to edge</i> | <b>YES</b>        |
|                          | <i>THR<sub>600s</sub> ≤ 7.5 MJ</i>                        | <i>1</i>        | <i>1.31</i>         | <b>YES</b>        |
|                          | <b>CRITERIA subclass 's1'</b>                             | <b>Nº TESTS</b> | <b>MEAN VALUE</b>   | <b>COMPLIANCE</b> |
|                          | <i>SMOGR<sub>A</sub> ≤ 30 m<sup>2</sup>/s<sup>2</sup></i> | <i>1</i>        | <i>0,00</i>         | <b>YES</b>        |
|                          | <i>TSP<sub>600s</sub> ≤ 50 m<sup>2</sup></i>              | <i>1</i>        | <i>21.16</i>        | <b>YES</b>        |
|                          | <b>CRITERIA subclass 'd0'</b>                             | <b>Nº TESTS</b> | <b>MEAN VALUE</b>   | <b>COMPLIANCE</b> |
|                          | <i>Fall of droplets/particles in flames within 600 s</i>  | <i>1</i>        | <i>NO</i>           | <b>YES</b>        |

*\*EN 13823 test has been partially tested (one single test specimen of three). But with the values obtained and according to the classification standard: EN 13501-1, the material could reach the following classification: **B-s1,d0**.*

## **4.- CLASSIFICATION AND FIELD OF APPLICATION**

### **4.1- Reference of classification**

This classification has been carried out in accordance with UNE-EN 13501-1:2019: "Classification in terms of the behaviour to fire of construction products and building elements. Part 1: Classification made from the data gathered during fire reaction tests".

### **4.2- Classification**

The product, LARSON FR (303 FR), in relation to its reaction to fire behaviour is classified:

**B**

The additional classification in relation to smoke production is:

**s1**

The additional classification in relation to flaming droplets / particles is:

**d0**

| Fire Behaviour |   | Smoke Production |   |   | Flaming droplets |   |
|----------------|---|------------------|---|---|------------------|---|
| B              | - | s                | 1 | , | d                | 0 |

**REACTION TO FIRE CLASSIFICATION : B-s1,d0**

**This classification is only valid for the final conditions of use described in the present report.**

The product, LARSON FR (605 FR), in relation to its reaction to fire behaviour is classified:

**B**

The additional classification in relation to smoke production is:

**s1**

The additional classification in relation to flaming droplets / particles is:

**d0**

| Fire Behaviour |   | Smoke Production |   |   | Flaming droplets |   |
|----------------|---|------------------|---|---|------------------|---|
| B              | - | s                | 1 | , | d                | 0 |

**REACTION TO FIRE CLASSIFICATION : B-s1,d0**

**This classification is only valid for the final conditions of use described in the present report.**

#### **4.3- Field of application (\*)**

- This classification is valid for the following product parameters:

The classification is only valid for the product characteristics shown, and may extend to the following parameters:

- Variable parameter 1: METAL MATERIAL

After performing the test with the aluminium coating and considering that:

- Components are not combustible and classified as A1 in accordance with the European Commission 96/603/CE
- Melting point of aluminium is approx. 660°C
- Melting point of steel and stainless steel is approx. 1400°C
- Melting point of copper is approx. 1085°C

It can be concluded by extension that the LARSON FR products with coatings:

Aluminium

Steel and stainless steel

Copper

Can be included in the same Euroclass.

*Futhermore, LARSON FR products can be manufactured using an anodized aluminium material called REAL ANODIZED or aluminium alloys as 5005 or 3000 series alloys. As REAL ANODIZED material and aluminium alloys do not have any type of coating on its surface (neither paint, not clear coat, etc) that can modify the classification of the product, by extension it is concluded that the products manufactured with REAL ANODIZED and aluminium alloys can be included in the same Euroclass.*

- Variable parameter 2: PAINT FINISHING

Products with the commercial reference LARSON FR are manufactured with different kind of paint finishing.

After performing the test according to UNE-EN ISO 1716:2011 standard, the paints with commercial reference PVDF 2L, PVDF 3L, HQPE, FEVE and SOLGEL paint (*Mirror-espejo finish*), it was obtained the following results:

In the report 21/22639-1004 on date 4<sup>th</sup> August, 2021:

PVDF 2L paint: 19,52 MJ/kg with a maximum application consumption 1,48 MJ/m<sup>2</sup>

PVDF 3L paint: 17,46 MJ/kg with a maximum application consumption 1,33 MJ/m<sup>2</sup>

HQPE/*DG5* paint: 19,61 MJ/kg with a maximum application consumption 1,49 MJ/m<sup>2</sup>

FEVE/*Fluorlac* paint: 19,06 MJ/kg with a maximum application consumption 1,45 MJ/m<sup>2</sup>

In the report 22/32305232 on date 18<sup>th</sup> July, 2022:

SOLGEL paint (*Mirror-espejo finish*): 4,40 MJ/kg with a maximum application consumption 0,08 MJ/m<sup>2</sup>

*And having determined which one is the most unfavourable, the complete tests (LARSON 303 FR and LARSON 605 FR) were completed over that finishing. By extension, the obtained results are valid for all of these mentioned paint finishing.*

**REACTION TO FIRE CLASSIFICATION : B-s1,d0**

***This classification is only valid for the final conditions of use described in the present report.***

*Furthermore, the products of the LARSON FR range can be manufactured applying a digital printing (Hashtag finish) as a paint finish. Whenever digital painting is applied, it will be done over a paint (HQPE/DG5 paint) or over a primer (PRIMER DUROLAC).*

*It was performed an indicative SBI test with LARSON FR 303+HASHTAG panel (LARSON FR panel with Hashtag finish + HQPE paint, aluminium 0.3 mm and mineral core 2.4 mm) in order to compare its results with the configuration most unfavourable of LARSON FR product (303 FR – LARSON FR panel with HQPE paint, aluminium 0.3 mm and mineral core 2.4 mm).*

*After performing the indicative test and compared the results it was determined that the Larson FR – 303 FR product remained the most unfavourable sample.*

*By extension, it is concluded that the LARSON FR range can be included in the following Euroclass:*

**REACTION TO FIRE CLASSIFICATION : B-s1,d0**

***This classification is only valid for the final conditions of use described in the present report.***

*According to the petitioner, LARSON FR range can be manufactured by applying the digital printing over a primer instead of a paint.*

*It was determinate the PCS of HQPE/DG5 paint, Hashtag finish and primer DUROLAC (Primer D) according to UNE-EN ISO 1716:2011 standard in order to study the Hashtag finish combined with the HQPE paint and the primer DUROLAC. It was obtained the following results:*

*In the report 21/22639-1004 on date 4<sup>th</sup> August, 2021:*

*HQPE/DG5 paint: 19,61 MJ/kg with a maximum application consumption 1,49 MJ/m<sup>2</sup>*

*In the report 22/32307594 on date 16<sup>th</sup> December, 2022:*

*Hashtag finish (Digital printing): 29,06 MJ/kg with a maximum application consumption 3,78 MJ/m<sup>2</sup>*

*In the report 23/32305112 on date 30<sup>th</sup> June, 2023:*

*Primer DUROLAC (Primer D): 14,84 MJ/kg with a maximum application consumption 0,48 MJ/m<sup>2</sup>*

*The following table shows the PCS of Hashtag finish with primer or paint:*

| <b>Product</b>                  | <b>PCS (MJ/Kg)</b> | <b>PCS (MJ/m<sup>2</sup>)</b> |
|---------------------------------|--------------------|-------------------------------|
| <i>Hashtag + HQPE/DG5</i>       | <i>25,40</i>       | <i>4,98</i>                   |
| <i>Hashtag + Primer DUROLAC</i> | <i>26,02</i>       | <i>3,97</i>                   |

*After studying the PCS (MJ/m<sup>2</sup>) of both combinations (Hashtag + HQPE/DG5 and Hashtag + Primer DUROLAC), and performing the indicative test with the most unfavourable configuration (Hashtag finish + HQPE paint), by extension, it is concluded that LARSON FR range using primer instead of HQPE/DG5 paint, are also included in the Euroclass obtained.*

**REACTION TO FIRE CLASSIFICATION : B-s1,d0**

***This classification is only valid for the final conditions of use described in the present report.***

- Variable parameter 3: SUBSTRATE

After performing the test with the product fixed on calcium silicate with 11±2 mm in thickness and 870±50 kg/m<sup>3</sup> in density, the obtained results are valid for substrates of classes A1 and A2-s1,d0, according to standard UNE-EN 13238:2011.

- Variable parameter 4: THICKNESS

Products with the commercial reference LARSON FR are manufactured with different thicknesses.

After performing the test with the minimum thickness (303 FR – aluminium 0.3 mm and mineral core 2.4 mm), and with the maximum thickness (605 FR – aluminium 0.5 mm and mineral core 5 mm), by extension it's concluded that the products:

303 FR – aluminium 0.3 mm and mineral core 2.4 mm

304 FR – aluminium 0.4 mm and mineral core 2.2 mm

305 FR – aluminium 0.5 mm and mineral core 2 mm

403 FR – aluminium 0.3 mm and mineral core 3.4 mm  
404 FR – aluminium 0.4 mm and mineral core 3.2 mm  
405 FR – aluminium 0.5 mm and mineral core 3 mm  
503 FR – aluminium 0.3 mm and mineral core 4.4 mm  
504 FR – aluminium 0.4 mm and mineral core 4.2 mm  
505 FR – aluminium 0.5 mm and mineral core 4 mm  
603 FR – aluminium 0.3 mm and mineral core 5.4 mm  
604 FR – aluminium 0.4 mm and mineral core 5.2 mm  
605 FR – aluminium 0.5 mm and mineral core 5 mm

Are included in the same Euroclass.

- Variable parameter 5: FIXING SYSTEM

The products with the commercial reference LARSON FR, are manufactured with different types of fixing system.

After carrying out the most unfavourable fixing system tests, by extension, it is concluded that LARSON FR product for both fixing systems:

Vertical riveted  
Cassette system

They are included with the same Euroclass.

Study carried out in the reports with file number 16/12641-1552 issued on September 29, 2016 and file number 18/16240-82 issued on January 18, 2018.

*In addition, according to the petitioner, Cassette system can be manufactured replacing Vertical profiles (LCH-1), Hangers (LC-3) and riveted by T-system elements (T-riveted (Vertical mullion profile T-2 and L-2) and T-trays (LCH-1T and LC-3T)).*

*LC-3T is actually the hanging piece that goes over the LCH-1T, thus performing the same function as the LC-3 on the LCH-1 profile.*

*Due to the metallic nature of the T-system elements not varying from the previous materials, and as the change only affects the orientation of the product's attachment to the substrate, it is considered that these materials will not contribute to the spread of fire.*

*Therefore, it is concluded that Larson FR products whose assembly have the T-system elements will achieve the following classification:*

**REACTION TO FIRE CLASSIFICATION : B-s1,d0**

***This classification is only valid for the final conditions of use described in the present report.***

- Variable parameter 6: SIGNI range

*Alucoil's composite panels with aluminium skins can be manufactured with different alloys. When alloys is 3000 series, products are called SIGNI instead of LARSON.*

*SIGNI 303 FR – aluminium 0.3 mm and mineral core 2.4 mm  
SIGNI 304 FR – aluminium 0.4 mm and mineral core 2.2 mm  
SIGNI 305 FR – aluminium 0.5 mm and mineral core 2 mm  
SIGNI 403 FR – aluminium 0.3 mm and mineral core 3.4 mm  
SIGNI 404 FR – aluminium 0.4 mm and mineral core 3.2 mm  
SIGNI 405 FR – aluminium 0.5 mm and mineral core 3 mm  
SIGNI 503 FR – aluminium 0.3 mm and mineral core 4.4 mm  
SIGNI 504 FR – aluminium 0.4 mm and mineral core 4.2 mm  
SIGNI 505 FR – aluminium 0.5 mm and mineral core 4 mm  
SIGNI 603 FR – aluminium 0.3 mm and mineral core 5.4 mm  
SIGNI 604 FR – aluminium 0.4 mm and mineral core 5.2 mm  
SIGNI 605 FR – aluminium 0.5 mm and mineral core 5 mm*

*By extension, as the aluminium alloys of the 3000 series do not modify the classification of the product, by extension it is concluded that the SIGNI range can included in the same Euroclass.*

**REACTION TO FIRE CLASSIFICATION : B-s1,d0**

***This classification is only valid for the final conditions of use described in the present report.***

*The fields of application described in PAINT FINISHING and FIXING SYSTEM section can be extended to SIGNI products.*

- The classification is valid for the following final use applications:

Making architectural facades.

**4.4.- LIMITATIONS**

This classification document does not represent type approval or certification of the product.

Laboratory Manager  
LGAI Technological Center S.A. (APPLUS)

Responsible of Euroclasses  
LGAI Technological Center S.A. (APPLUS)

The results refer exclusively to the samples tested at the time and under the conditions indicated. At the customer's request, the agreed decision rule to declare conformance to the specification or standard, is by following a simple binary decision rule. In this case, the upper limit of the probability value of false acceptance or false rejection, according to ILAC G8, is 50%.

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