

# REPORT No 11671

*Date of issue: April 22, 2026*

**Status: FINAL REPORT**

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# ISO 9227

## SALT SPRAY TEST

### Neutral Salt Spray (NSS)

### Program: SQO-M1 Round 15

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|   |   |   |
|---|---|---|
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## 1. FOREWORD

This report summarizes the results of the **SQO-M1 (Round 15)** proficiency testing program on the determination of corrosion resistance of metallic materials. This program is carried out under a simultaneous participation format, as described in clause A.2.2 of ISO/IEC 17043: 2023 (Types of PT schemes).

**South Quality** conducted the testing program from February to April 2026. The aim of the program was to assess laboratory ability to competently perform the nominated tests.

## 2. ORGANIZATION

|                       |                      |
|-----------------------|----------------------|
| Program Coordinator:  | Eng. Erika Brest     |
| Assistant Technician: | Mateo Giovanni       |
| Statistics:           | Lic. Manuel Tozaki   |
| Supervision:          | Eng. Emiliano Medina |

## 3. OBJECTIVE

The objective of this proficiency testing program is to determine corrosion resistance of metallic materials using the following standard:

| Standard   |
|--|
| ISO 9227: 2022 + AMD 1: 2024<br>Neutral Salt Spray (NSS) |

To verify this, batches of metallic sheets and bolts have been chosen.

Participants in this program have not been previously informed of the time or time range for the appearance of the first signs of corrosion, nor of the expected mass change of the samples they receive.

As part of the standard practice in this program, three types of shipments are sent to participants during the annual rounds, which may take the following form:

- i. Sample A (Corrosion-resistant) + Sample B (Corrosion-resistant).
- ii. Sample A (Corrosion-resistant) + Sample B (Corrosion-susceptible).
- iii. Sample A (Corrosion-susceptible) + Sample B (Corrosion-susceptible).

#### 4. PARTICIPANTS

In the present round, 22 laboratories have participated with the following details:

| CODE | Country      | ISO 17025 accredited | Results delivered |
|------|--------------|----------------------|-------------------|
| 01   | Malaysia     | Yes                  | Yes               |
| 02   | Argentina    | Yes                  | No                |
| 03   | Germany      | Yes                  | Yes               |
| 04   | South Africa | No                   | Yes               |
| 05   | Italy        | Yes                  | Yes               |
| 06   | Vietnam      | Yes                  | No                |
| 07   | Hong Kong    | Yes                  | Yes               |
| 08   | Australia    | Yes                  | Yes               |
| 09   | Japan        | Yes                  | Yes               |
| 10   | Colombia     | Yes                  | Yes               |
| 11   | Spain        | Yes                  | Yes               |
| 12   | Netherlands  | Yes                  | No                |
| 13   | Spain        | No                   | Yes               |
| 14   | Germany      | Yes                  | Yes               |
| 15   | France       | Yes                  | Yes               |
| 16   | Peru         | No                   | Yes               |
| 17   | France       | Yes                  | Yes               |
| 18   | Chile        | Yes                  | Yes               |
| 19   | Belgium      | Yes                  | Yes               |
| 20   | Romania      | Yes                  | Yes               |
| 21   | Brazil       | No                   | Yes               |
| 22   | England      | Yes                  | No                |

## 5. HOMOGENEITY

Several batches were prepared identically by the staff at South Quality.

Then, a homogeneity study was carried out, verifying the time elapsed to the **first sign of corrosion (FSC)** and the **change in mass**, with an ISO/IEC 17025 accredited laboratory.

The control process followed ISO 33405: 2024, clauses 7.4.1.1 / 7.4.1.2. Stratified random sampling was applied, and the samples were selected using random-number-generation software.

The results of this test appear below:

Size of each batch: **100 samples**

Tested samples from each batch: **20 samples**

| DETERMINATION  | HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES<br>- STEEL SHEET - |               |               |
|----------------|---|---------------|---------------|
|                | BATCH: LM3512   | BATCH: LM3513 | BATCH: LM3514 |
| FSC            | YES   | YES           | YES           |
| Change in mass | YES   | YES           | YES           |

| DETERMINATION  | HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES<br>- BOLTS - |               |               |
|----------------|---|---------------|---------------|
|                | BATCH: LM3720   | BATCH: LM3721 | BATCH: LM3722 |
| FSC            | NO  | YES           | YES           |
| Change in mass | NO  | YES           | YES           |

Samples for this program are taken from selected batches identified as **LM3514** and **LM3721**.

Analysis of this testing data indicated that samples were sufficiently homogeneous for the program and, therefore, any participant results identified as outliers cannot be attributed to sample variability.

## 6. SAMPLE INFORMATION

The following samples were sent for testing (Participant **Code 21**):

|                  |   |
|------------------|---|
| Batch:           | LM3514                                      |
| Sample ID:       | 09 + 62 + 73                                |
| Characteristics: | Steel sheet (SAE 1010) - 150 x 100 x 0.7 mm |

|                  |   |
|------------------|---|
| Batch:           | LM3721  |
| Sample ID:       | 21  |
| Characteristics: | Steel bolt (Metallic coated) - 5/16" x 2 1/4" - 5 units |

**7. IMAGES**



## 8. ASSIGNED VALUES

The assigned values are obtained from the results reported by all participants (**Consensus values**).

## 9. PARTICIPANTS RESULTS

| LABORATORY CODE | LM3514        |               |  | LM3721 |               |                        |
|-----------------|---------------|---------------|--|--------|---------------|------------------------|
|                 | SAMPLE        | FSC - AVG (h) | CHANGE IN MASS AVG (g/m <sup>2</sup> ) | SAMPLE | FSC - AVG (h) | CHANGE IN MASS AVG (%) |
| 01              | 26 + 39 + 67  | 24            | -23.45                                 | 01     | 24            | -0.60                  |
| 03              | 30 + 45 + 77  | 24            | -26.45                                 | 03     | 48            | -0.65                  |
| 04              | 10 + 41 + 96  | 24            | -19.25                                 | 04     | 48            | -0.44                  |
| 05              | 05 + 61 + 97  | 24            | -21.56                                 | 05     | 36            | -0.31                  |
| 07              | 24 + 37 + 91  | 24            | -26.02                                 | 07     | 20            | -0.39                  |
| 08              | 19 + 35 + 68  | 24            | -20.98                                 | 08     | 24            | -0.75                  |
| 09              | 04 + 47 + 79  | 24            | -21.09                                 | 09     | 30            | -0.32                  |
| 10              | 28 + 64 + 69  | 48            | -18.75                                 | 10     | 72            | -0.28                  |
| 11              | 31 + 48 + 100 | 24            | -19.80                                 | 11     | 18            | -0.38                  |
| 13              | 32 + 57 + 83  | 24            | -23.12                                 | 13     | 24            | -0.49                  |
| 14              | 23 + 52 + 70  | 24            | -21.21                                 | 14     | 48            | -0.56                  |
| 15              | 11 + 59 + 88  | 24            | -25.03                                 | 15     | 24            | -0.54                  |
| 16              | 02 + 66 + 71  | 24            | -36.80                                 | 16     | 82            | -0.58                  |
| 17              | 16 + 44 + 84  | 24            | -24.12                                 | 17     | 22            | -0.34                  |
| 18              | 22 + 36 + 80  | 24            | -16.32                                 | 18     | 48            | -0.06                  |
| 19              | 25 + 38 + 82  | 6             | -20.96                                 | 19     | 19            | -                      |
| 20              | 12 + 51 + 98  | -             | -22.08                                 | 20     | -             | -0.56                  |
| 21              | 09 + 62 + 73  | 25            | 57.44                                  | 21     | 25            | 0.28                   |

| ASSIGNED VALUES                     |        |                      |        |
|-------------------------------------|--------|----------------------|--------|
| PROPERTY                            | LM3514 | PROPERTY             | LM3721 |
| FSC (h):                            | 24     | FSC (h):             | 25     |
| CHANGE IN MASS (g/m <sup>2</sup> ): | -21.39 | CHANGE IN MASS (%):  | -0.44  |
| CHANGE IN MASS (SD):                | 3.98   | CHANGE IN MASS (SD): | 0.22   |

## 10. STATISTICS

The results must be treated as qualitative and quantitative.

According to B.4.1.3 of ISO/IEC 17043: 2023, the appropriate technique is to compare participant results with the assigned values

a) For the variable **FSC** the comparison is made through the difference **D** (B.1 – ISO/IEC 17043: 2023).

$$D = (x - X)$$

$x$  is the participant's result

$X$  is the assigned value

The performance evaluation is carried out with the following criteria:

**$|D| \leq 12$  h indicates “satisfactory” performance and generates no signal;**

**$12$  h <  $|D| \leq 24$  h indicates “questionable” performance and generates a warning signal;**

**$|D| > 24$  h indicates “unsatisfactory” performance and generates an action signal;**

In those samples where there is no degradation of the material, the result is treated as qualitative and must match with the assigned value to be considered **satisfactory**, otherwise, it is evaluated as **unsatisfactory**.

b) For the variable **CHANGE IN MASS** the comparison is made through  $z$  score (B.3 – ISO/IEC 17043: 2023).

$$z = \frac{x - X}{\hat{\sigma}}$$

$x$  is the participant's result

$X$  is the assigned value

$\hat{\sigma}$  is the standard deviation

The performance evaluation is carried out with the following criteria:

**$|z| \leq 2.0$  indicates “satisfactory” performance and generates no signal;**

**$2.0 < |z| < 3.0$  indicates “questionable” performance and generates a warning signal;**

**$|z| \geq 3.0$  indicates “unsatisfactory” performance and generates an action signal;**

## 11. EVALUATION OF PERFORMANCE

| LABORATORY CODE | LM3514                          |            | LM3721                          |            |
|-----------------|---------------------------------|------------|---------------------------------|------------|
|                 | FSC - AVG<br>( h / Unaffected ) | <b> D </b> | FSC - AVG<br>( h / Unaffected ) | <b> D </b> |
| 01              | 24                              | 0          | 24                              | 1          |
| 03              | 24                              | 0          | 36                              | 11         |
| 04              | 24                              | 0          | 48                              | 23         |
| 05              | 24                              | 0          | 36                              | 11         |
| 07              | 24                              | 0          | 20                              | 5          |
| 08              | 24                              | 0          | 24                              | 1          |
| 09              | 24                              | 0          | 30                              | 5          |
| 10              | 48                              | 24         | 72                              | 47         |
| 11              | 24                              | 0          | 18                              | 7          |
| 13              | 24                              | 0          | 24                              | 1          |
| 14              | 24                              | 0          | 48                              | 23         |
| 15              | 24                              | 0          | 24                              | 1          |
| 16              | 24                              | 0          | 82                              | 57         |
| 17              | 24                              | 0          | 22                              | 3          |
| 18              | 24                              | 0          | 48                              | 23         |
| 19              | 6                               | 18         | 19                              | 6          |
| 20              | -                               | -          | -                               | -          |
| 21              | 25                              | 1          | 25                              | 0          |

| LABORATORY CODE | LM3514                                   |         | LM3721                   |         |
|-----------------|--|---------|--------------------------|---------|
|                 | CHANGE IN MASS - AVG (g/m <sup>2</sup> ) | z score | CHANGE IN MASS - AVG (%) | z score |
| 01              | -23.45                                   | 0.5     | -0.60                    | 0.7     |
| 03              | -26.45                                   | 1.3     | -0.65                    | 1.0     |
| 04              | -19.25                                   | 0.5     | -0.44                    | 0       |
| 05              | -21.56                                   | 0       | -0.31                    | 0.6     |
| 07              | -26.02                                   | 1.2     | -0.39                    | 0.2     |
| 08              | -20.98                                   | 0.1     | -0.75                    | 1.4     |
| 09              | -21.09                                   | 0.1     | -0.32                    | 0.5     |
| 10              | -18.75                                   | 0.7     | -0.28                    | 0.7     |
| 11              | -19.80                                   | 0.4     | -0.38                    | 0.3     |
| 13              | -23.12                                   | 0.4     | -0.49                    | 0.2     |
| 14              | -21.21                                   | 0       | -0.56                    | 0.5     |
| 15              | -25.03                                   | 0.9     | -0.54                    | 0.5     |
| 16              | -36.80                                   | 3.9     | -0.58                    | 0.6     |
| 17              | -24.12                                   | 0.7     | -0.34                    | 0.5     |
| 18              | -16.32                                   | 1.3     | -0.06                    | 1.7     |
| 19              | -20.96                                   | 0.1     | -                        | -       |
| 20              | -22.08                                   | 0.2     | -0.56                    | 0.5     |
| 21              | 57.44                                    | 19.8    | 0.28                     | 3.3     |

Laboratory Code 01: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 02: The laboratory did not submit the results before the deadline.

Laboratory Code 03: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 04: The laboratory obtained **QUESTIONABLE** results in the determination of FSC for the LM3721 batch; however, the results for the remaining parameters were **SATISFACTORY**.

Laboratory Code 05: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 06: The laboratory did not submit the results before the deadline.

Laboratory Code 07: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 08: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 09: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 10: The laboratory obtained **QUESTIONABLE** results in the determination of FSC for the LM3514 batch and **UNSATISFACTORY** results in the determination of FSC for the LM3721 batch; however, the results for the change in mass were **SATISFACTORY**.

Laboratory Code 11: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 12: The laboratory did not submit the results before the deadline.

Laboratory Code 13: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 14: The laboratory obtained **QUESTIONABLE** results in the determination of FSC for the LM3721 batch; however, the results for the remaining parameters were **SATISFACTORY**.

Laboratory Code 15: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 16: The laboratory obtained **UNSATISFACTORY** results in the determination of change in mass for the LM3514 batch and **UNSATISFACTORY** results in the determination of FSC for the LM3721 batch; however, the results for the remaining parameters were **SATISFACTORY**.

Laboratory Code 17: The laboratory obtained **SATISFACTORY** results in the determination of all parameters.

Laboratory Code 18: The laboratory obtained **QUESTIONABLE** results in the determination of FSC for the LM3721 batch; however, the results for the remaining parameters were **SATISFACTORY**.

Laboratory Code 19: The laboratory obtained **QUESTIONABLE** results in the determination of FSC for the LM3514 batch; however, the results for the remaining parameters were **SATISFACTORY**, except for the change in mass of the LM3721 batch, which was not reported.

Laboratory Code 20: The laboratory obtained **SATISFACTORY** results in the determination of change in mass for both batches; however, FSC results were not reported because this parameter is not determined in their laboratory.

Laboratory Code 21: The laboratory obtained **UNSATISFACTORY** results in the determination of change in mass for both batches (LM3514 and LM3721); however, the results for FSC were **SATISFACTORY**.

Laboratory Code 22: The laboratory did not submit the results before the deadline.

## 12. CONCLUSIONS

The overall performance on this **SQO-M1 (Round 15)** program from the participating laboratories, based on expected results, are the following:

- Laboratory Codes **01, 03, 05, 07, 08, 09, 11, 13, 15, 17,** and **20** have obtained a **SUFFICIENT** performance in accordance with the expected results and should not take action;
- Laboratory Codes **04, 14, 18,** and **19** have obtained an **ALMOST SUFFICIENT** performance in accordance with the expected results and must evaluate whether corrective action is necessary;
- Laboratory Codes **10, 16** and **21** have obtained an **INSUFFICIENT** performance in accordance with the expected results and must take corrective action (See Appendix B).

The criteria used for the evaluation of the overall performance are as follows:

- **SUFFICIENT** performance: No unsatisfactory or questionable results were obtained.
- **ALMOST SUFFICIENT** performance: No unsatisfactory results were obtained, but one questionable result was found.
- **INSUFFICIENT** performance: At least one unsatisfactory result or two questionable results were obtained.

# APPENDIX A

## A1 - PARTICIPANT DATA

Company: **Luxparts S.A.**

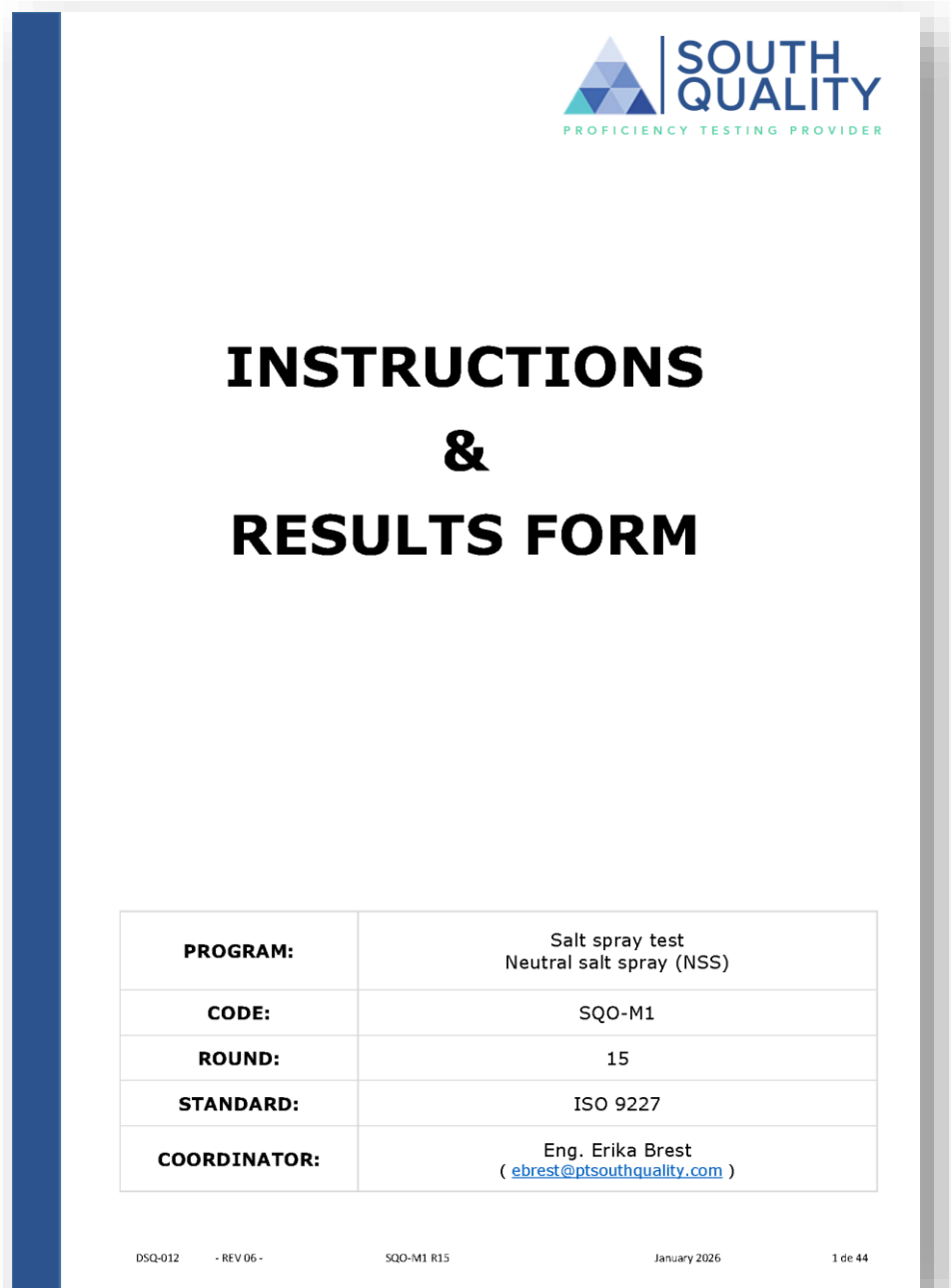
Laboratory: **Laboratório de ensaios Lightlabs**


Country: **Brazil**

Client ID: **E494**

Contact person: **Elisabete Minussi - Laboratory Analyst - Team leader**  
( [engenhariadetestes4pradolux@gmail.com](mailto:engenhariadetestes4pradolux@gmail.com) )

## A2 - PARTICIPANT RESULTS



 **SOUTH  
QUALITY**  
PROFICIENCY TESTING PROVIDER

# INSTRUCTIONS & RESULTS FORM

|                     |  |
|---------------------|--|
| <b>PROGRAM:</b>     | Salt spray test<br>Neutral salt spray (NSS)  |
| <b>CODE:</b>        | SQO-M1   |
| <b>ROUND:</b>       | 15   |
| <b>STANDARD:</b>    | ISO 9227   |
| <b>COORDINATOR:</b> | Eng. Erika Brest<br>( <a href="mailto:ebrest@ptsouthquality.com">ebrest@ptsouthquality.com</a> ) |

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### 1 - General

This document is intended to be filled with the results of the **SQO-M1 (Round 15)** program.

Results must be typed, not handwritten.

### 2 - Standard

**ISO 9227: 2022 + AMD1: 2024**

### 3 - Participant

|  |                |
|--|----------------|
| <b>LUXPARTS S.A.</b><br>Laboratório de ensaios Lightlabs | <b>CODE 21</b> |
|--|----------------|

### 4 - Tests involved

| TEST   |
|--|
| Assessment of corrosion resistance of metallic materials |

### 5 - Samples

| CODE      | CHARACTERISTICS                                | QUANTITY |
|-----------|--|----------|
| LM3514-XX | Metallic coated sheet - 150 x 100 x 0.7 mm     | 3        |
| LM3721-21 | Steel bolt (Metallic coated) - 5/16" x 2 1/4 " | 5        |

### 6 - Notes

- a) The deadline for the delivery of results is **March 20, 2026**
- b) The tables in this document may be modified by the participant, if desired, to include data or observations.
- c) The samples must be kept until the end of the program, which concludes with the submission of the final report.
- d) The samples are to be handled as routine lab samples, with all testing, documentation, and reporting adhering to **ISO 9227**.
- e) Samples **LM3514-XX** are identified on their back side.
- f) To review the results, the submission of images of the tests is appreciated. These images can be attached at the end of this document or sent via email.
- g) Upon completion of this document, please convert it to a PDF file and send it to the program coordinator.

## 7 - Preparation of tests specimens

A) Samples shall be properly cleaned, ensuring they are not recontaminated after cleaning due to excessive or careless handling.

B) **(For LM3514-XX samples only)** - Weigh the samples to the nearest 1 mg (**m1**).

C) **(For LM3514-XX samples only)** - The back side and cut edges must be adequately protected by coating them with a suitable material that remains stable under test conditions, such as paint, wax, or adhesive tape. The protective edges on the front face must be straight and parallel to the sample edges, leaving a rectangular area of the material exposed.

D) **(For LM3514-XX samples only)** - Determine the exposed material area (**A**) in cm<sup>2</sup>.

## 8 - Test conditions

|                         |  |
|-------------------------|--|
| Procedure:              | According to standard  |
| Duration of test:       | 168 h  |
| Inspection frequency:   | 24 h   |
| Parameter to determine: | First sign of corrosion ( <b>FSC</b> ) - Red or with rust                          |
| Final measurement:      | Weigh the specimens to the nearest 1 mg ( <b>m2</b> ), without protective coatings |

## 9 - Test results

| ID        | A ( cm <sup>2</sup> ) | m1 ( mg ) | m2 ( mg ) | FSC ( h )                |
|-----------|-----------------------|-----------|-----------|--------------------------|
| LM3514-09 | 75,36                 | 87,611    | 92,053    | 25:35<br>(1° inspection) |
| LM3514-62 | 95,34                 | 85,406    | 90,771    | 25:35<br>(1° inspection) |
| LM3514-73 | 88,99                 | 90,260    | 95,342    | 25:35<br>(1° inspection) |

| ID        | SAMPLE | m1 ( mg ) | m2 ( mg ) | FSC ( h )                |
|-----------|--------|-----------|-----------|--------------------------|
| LM3721-21 | I      | 23,8354   | 23,8836   | 25:35<br>(1° inspection) |
|           | II     | 23,8579   | 23,9404   | 25:35<br>(1° inspection) |
|           | III    | 23,8464   | 23,9215   | 25:35<br>(1° inspection) |
|           | IV     | 23,9194   | 24,0006   | 25:35<br>(1° inspection) |
|           | V      | 23,8947   | 23,9670   | 25:35<br>(1° inspection) |

10 - Information and observations (According Clause 14.2)

| Cl. | Information  |
|-----|--|
| b)  | <p><b>Type and purity of salt and water used</b></p> <p><b>Salt:</b> Analytical grade sodium chloride (NaCl) (CAS No. 7647-14-5), with the following specifications:</p> <ul style="list-style-type: none"> <li>• pH (5% solution at 25 °C): 7.00</li> <li>• Copper (Cu) content: max. 0.001%</li> <li>• Nickel (Ni) content: max. 0.001%</li> <li>• Lead (Pb) content: max. 0.003%</li> <li>• Iodide, bromide, and fluoride: max. 0.1%</li> <li>• Total impurities: max. 0.3%</li> <li>• Free from anti-caking agents</li> </ul> <p><b>Water Used:</b> Deionized water</p>  |
| e)  | <p><b>Preparation of the test specimen, including any cleaning treatment applied and any protection given to edges or other special áreas</b></p> <p>No cleaning treatment was applied to the samples prior to testing. The specimens were received properly packaged and were handled using gloves to prevent contamination. The metallic coated sheets were prepared in accordance with the applicable instruction, with the edges protected using red adhesive tape, resulting in a quadrilateral exposure area.</p>  |
| h)  | <p><b>Method used to clean test specimens after the test with, where appropriate, an indication of the loss in mass resulting from the cleaning operation</b></p> <p>The cleaning procedure was carried out in accordance with the test standard instructions. The specimens were removed from the chamber and placed on clean trays to avoid contamination. They were then allowed to dry for 50 minutes. After this period, the samples were carefully rinsed with running water, ensuring that corrosion products were not removed. Following rinsing, the specimens were dried using low-pressure compressed air to prevent damage to both the samples and the corrosion products.</p> |
| i)  | <p><b>Angle at which the tested surfaces were inclined</b></p> <p>The specimens were mounted on nylon mesh supports installed in a vertical arrangement. An inclinometer was placed adjacent to the specimens to verify their positioning angle. Measured angles ranged from 20° to 21° for the metallic coated sheet and from 18° to 19° for the steel bolt.</p>  |
| m)  | <p><b>Test temperature</b></p> <p>The temperature inside the test chamber was maintained at approximately 35 °C throughout the duration of the test, with minor variations as shown in the table below. The environmental conditions of the room where the equipment is installed were also controlled and monitored at the time of verification, yielding the following results:</p>  |

| Equipment Internal Temperature (°C) | Ambient Temperature (°C) | Ambient Relative Humidity (%) | Atmospheric Pressure (hPa) |
|-------------------------------------|--------------------------|-------------------------------|----------------------------|
| 35,04                               | 24,00                    | 42,80                         | 873,00                     |
| 34,83                               | 23,80                    | 53,30                         | 874,00                     |
| 35,01                               | 22,50                    | 65,70                         | 872,00                     |
| 34,99                               | 23,00                    | 57,50                         | 873,00                     |
| 35,00                               | 23,30                    | 57,00                         | 875,00                     |
| 34,98                               | 23,00                    | 51,10                         | 875,00                     |
| 35,00                               | 21,30                    | 63,90                         | 873,00                     |

| n) | <b>Volume of the collected solution</b>   |            |  |  |                                |
|----|---|------------|--|--|--------------------------------|
|    | The volume of collected solution at each verification and the corresponding collection rate are presented in the table below. |            |  |  |                                |
|    | Verification  | Cycle time | Collected Solution Graduated Cylinder 1 (mL) | Collected Solution Graduated Cylinder 2 (mL) | Average Collection Rate (mL/h) |
|    | 1   | 25:35      | 15,60  | 22,50  | 1,49                           |
|    | 2   | 47:47      | 20,70  | 18,70  | 1,77                           |
|    | 3   | 72:00      | 19,50  | 26,00  | 1,88                           |
|    | 4   | 95:50      | 22,00  | 23,30  | 1,90                           |
|    | 5   | 120:01     | 22,00  | 23,50  | 1,88                           |
|    | 6   | 144:01     | 21,00  | 25,00  | 1,92                           |
| 7  | 168:00  | 22,50      | 22,00  | 1,86   |                                |

| o) | <b>pH of the test solution and the collected solution</b> |      |
|----|---|------|
|    | Test solution   | pH   |
|    | 1   | 6,79 |
|    | 2   | 6,84 |
|    | 3   | 7,02 |
|    | 4   | 6,82 |
|    | 5   | 6,70 |
|    | 6   | 7,06 |
|    | 7   | 6,93 |
|    | 8   | 7,11 |
|    | 9   | 6,60 |
|    | 10  | 6,87 |
|    | Collected solution  | pH   |
|    | 1   | 7,01 |
|    | 2   | 7,09 |
|    | 3   | 7,15 |
|    | 4   | 7,06 |
|    | 5   | 7,12 |
|    | 6   | 7,10 |
| 7  | 7,16  |      |

|           |   |                      |
|-----------|---|----------------------|
| <b>p)</b> | <b>Salt concentration or density of the collected solution</b>  |                      |
|           | <b>Collected Solution</b>   | <b>Concentration</b> |
|           | 1   | 4,55                 |
|           | 2   | 4,60                 |
|           | 3   | 4,55                 |
|           | 4   | 4,55                 |
|           | 5   | 4,60                 |
|           | 6   | 4,60                 |
| 7         | 4,55  |                      |
| <b>r)</b> | <p><b>Any deviations or incident occurring during the entire test procedure</b></p> <p>The only deviation observed was previously reported to Ms. Brest: samples LM3514-09, LM3514-62, and LM3514-73 were received with visible signs of corrosion, as shown in the images included in this report.</p> <p>An increase in corrosion was observed within the first 24 hours of exposure. Following communication with Ms. Brest, it was agreed that the report should state that the corrosion occurred within the first 24 hours.</p> |                      |
| <b>s)</b> | <b>Intervals of inspection</b>  |                      |
|           | <p>The specimens were inspected and the test parameters were verified at approximately 24-hour intervals. The cycle time for each inspection is presented in the table below.</p>   |                      |
|           | <b>Verification</b>   | <b>Cycle time</b>    |
|           | 1   | 25:35                |
|           | 2   | 47:47                |
|           | 3   | 72:00                |
|           | 4   | 95:50                |
|           | 5   | 120:01               |
| 6         | 144:01  |                      |
| 7         | 168:00  |                      |

**OBSERVATIONS**

**Observations on Test Specimens**

**Samples LM3514-09, LM3514-62, and LM3514-73**

- These samples exhibited similar behavior throughout the test and, consequently, after the removal of superficial corrosion products. A high level of corrosion and significant degradation were observed, with a predominance of red corrosion, as indicated by brown, reddish, and orange tones. Dark regions were also observed, indicating the presence of black corrosion.
- The attack on the exposed area was severe and continuous, resulting in an irregular and non-uniform surface appearance.

**Samples LM3721-21**

- These samples also exhibited similar behavior throughout the test and after the removal of superficial corrosion products. A moderate level of corrosion was observed, mainly localized on the screw threads and heads, with small spots along the shank. The corrosion was predominantly black, with a smaller presence of white corrosion.
- Steel bolt sample 3 exhibited a localized spot of red corrosion. This spot was attributed to contamination from corrosion products originating from the metallic coated sheet and was therefore not considered in the sample evaluation. No progression of this corrosion spot was observed throughout the subsequent inspections.

**Equipment Used**

The equipment used is listed along with the laboratory internal control code (DMM) and the respective calibration certificate.

| Equipment                      | DMM                 | Calibration Certificate     |
|--------------------------------|---------------------|-----------------------------|
| Salt Spray Chamber             | DMM 602             | SQA202407250019             |
| Deionizer                      | DMM 606             | Verified Internally         |
| Semi-Analytical Balance        | DMM 506             | Verified Internally         |
| Analytical Balance             | DMM 508             | Verified Internally         |
| pH Meter (Electrode and Probe) | DMM 607             | AK5966/2024 and AK5967/2024 |
| Thermo-Hygro-Barometer         | DMM 614             | 53039/25and 52436/25        |
| 5 L Volumetric Flask           | DMM 604 and DMM 605 | Verified Internally         |
| Graduated Cylinder             | DMM 653             | 5654/25                     |

**PHOTOGRAPHS**

**Images of Samples as Received at the Laboratory**



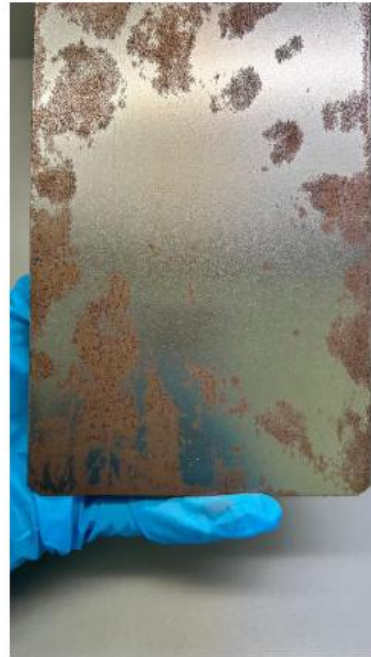
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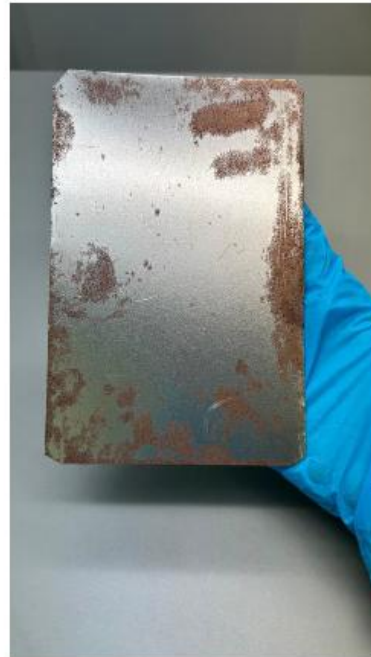
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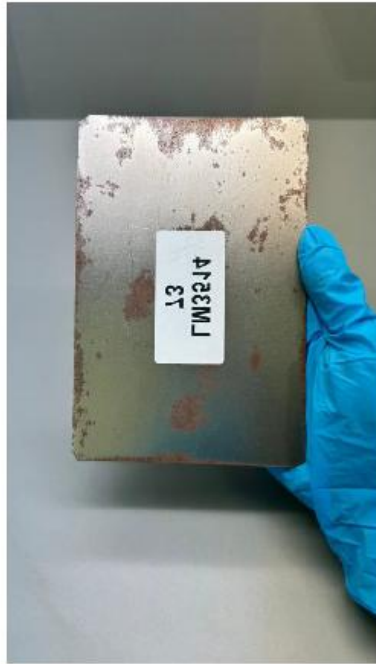


**Sample 1 – LM3514-09**

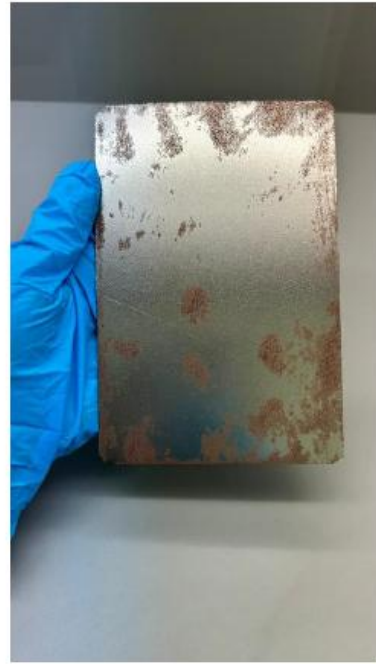


**Sample 2 – LM3514-62**





**Sample 3 – LM3514-73**



**Sample 1 - LM3721-21**

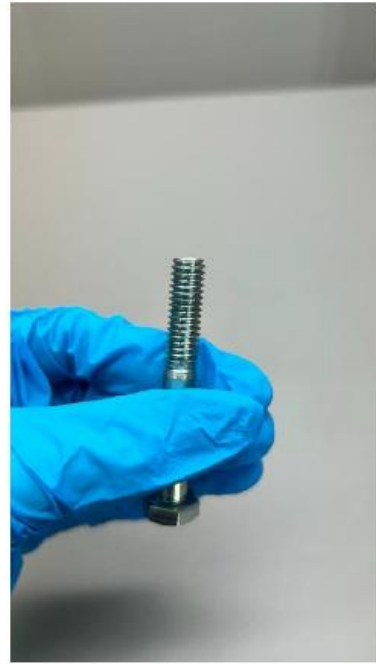




**Sample 2 - LM3721-21**

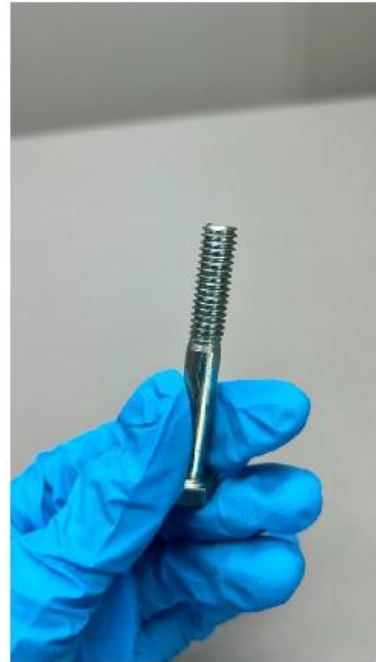


**Sample 3 - LM3721-21**





**Sample 4 - LM3721-21**

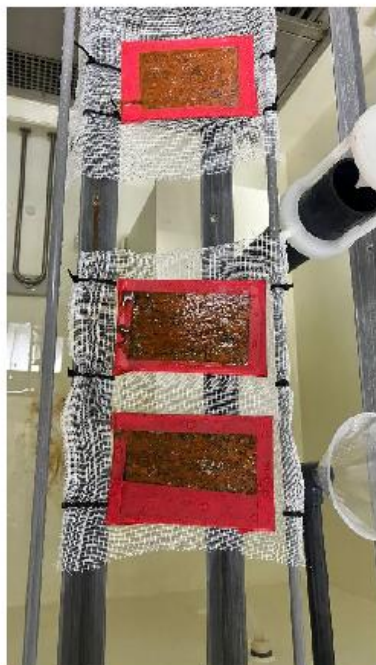


**Sample 5 - LM3721-21**



**Results of the First Inspection**

Significant corrosion was observed on the metallic coated sheets, while the steel bolts exhibited initial signs of corrosion.



**Sample 1 - LM3514-09**



**Sample 2 - LM3514-62**



**Sample 3 - LM351473**



**Sample 1 - LM3721-21**





**Sample 2 - LM3721-21**



**Sample 3 - LM3721-21**





**Sample 4 - LM3721-21**



**Sample 5 - LM3721-21**

**Results of the Second Inspection**

In all subsequent inspections, an increase in corrosion was observed on the specimens. The steel bolts showed progression of corrosion across the surface, with new areas being affected that had not previously exhibited corrosion.

For the metallic coated sheets, the progression was characterized by an increase in the thickness of the corrosion layer, which became progressively more pronounced over the course of the inspections.



**Sample 1 - LM3514-09**



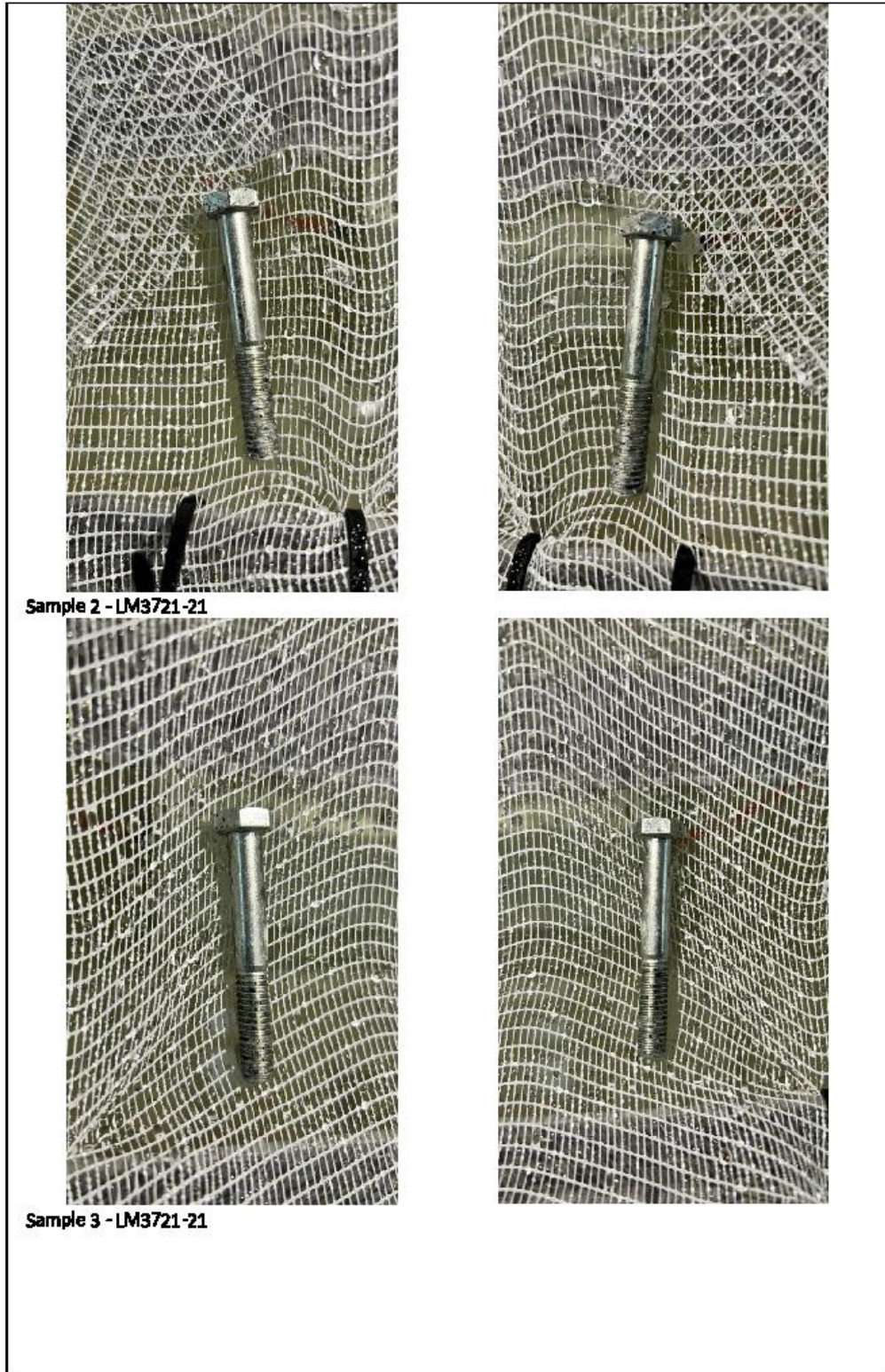
**Sample 2 - LM3514-62**



**Sample 3 - LM351473**



**Sample 1 - LM3721-21**



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**Sample 4 - LM3721-21**



**Sample 5 - LM3721-21**



**Results of the Third Inspection**



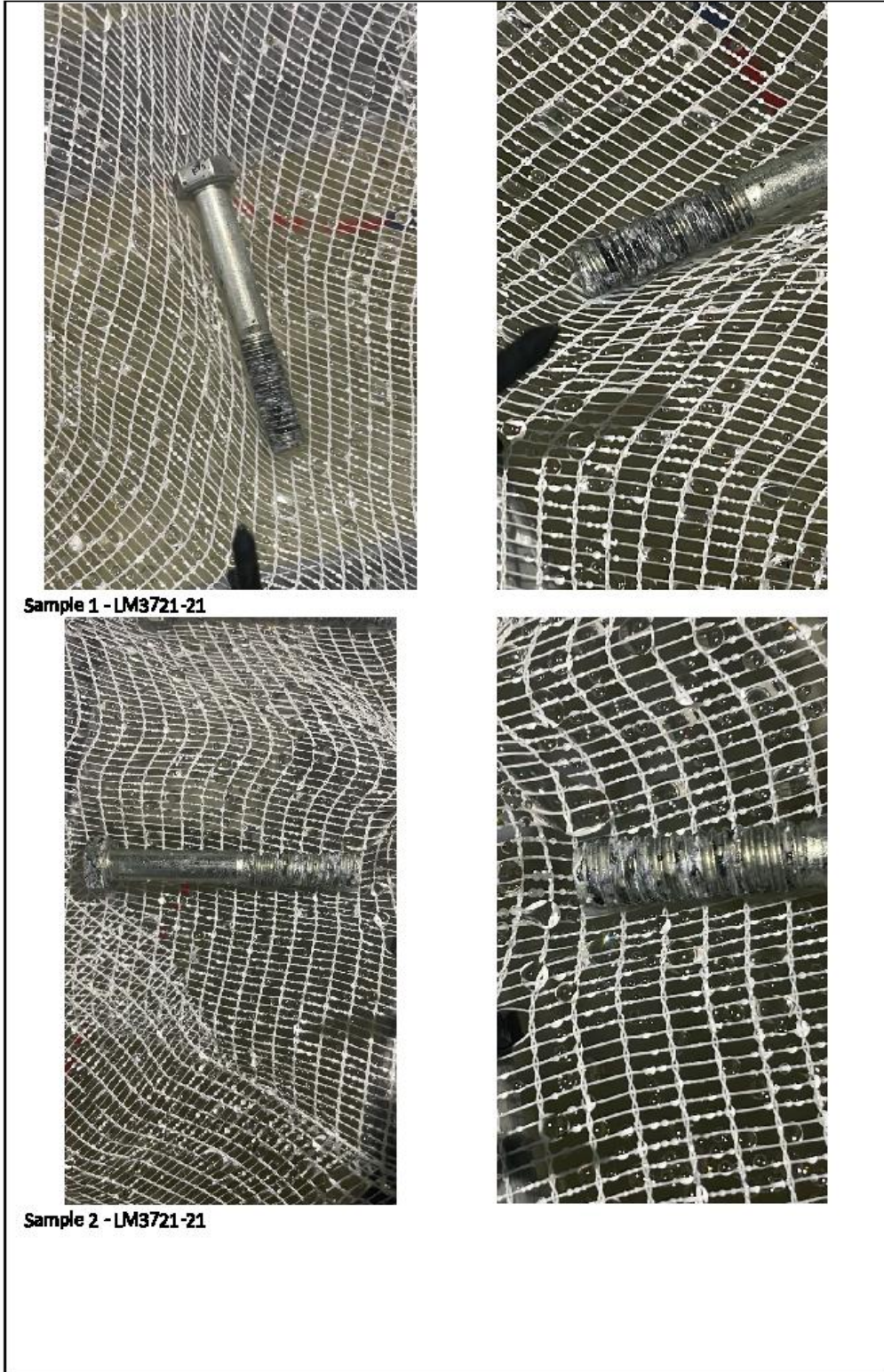
**Sample 1 - LM3514-09**



**Sample 2 - LM3514-62**



**Sample 3 - LM351473**



**Sample 1 - LM3721-21**

**Sample 2 - LM3721-21**



**Sample 3 - LM3721-21**



**Sample 4 - LM3721-21**





**Sample 5 - LM3721-21**

**Results of the Fourth Inspection**



**Sample 1 - LM3514-09**



**Sample 2 - LM3514-62**



**Sample 3 - LM351473**



**Sample 1 - LM3721-21**



**Sample 2 - LM3721-21**





**Sample 3 - LM3721-21**



**Sample 4 - LM3721-21**



**Sample 5 - LM3721-21**

**Results of the Fifth Inspection**



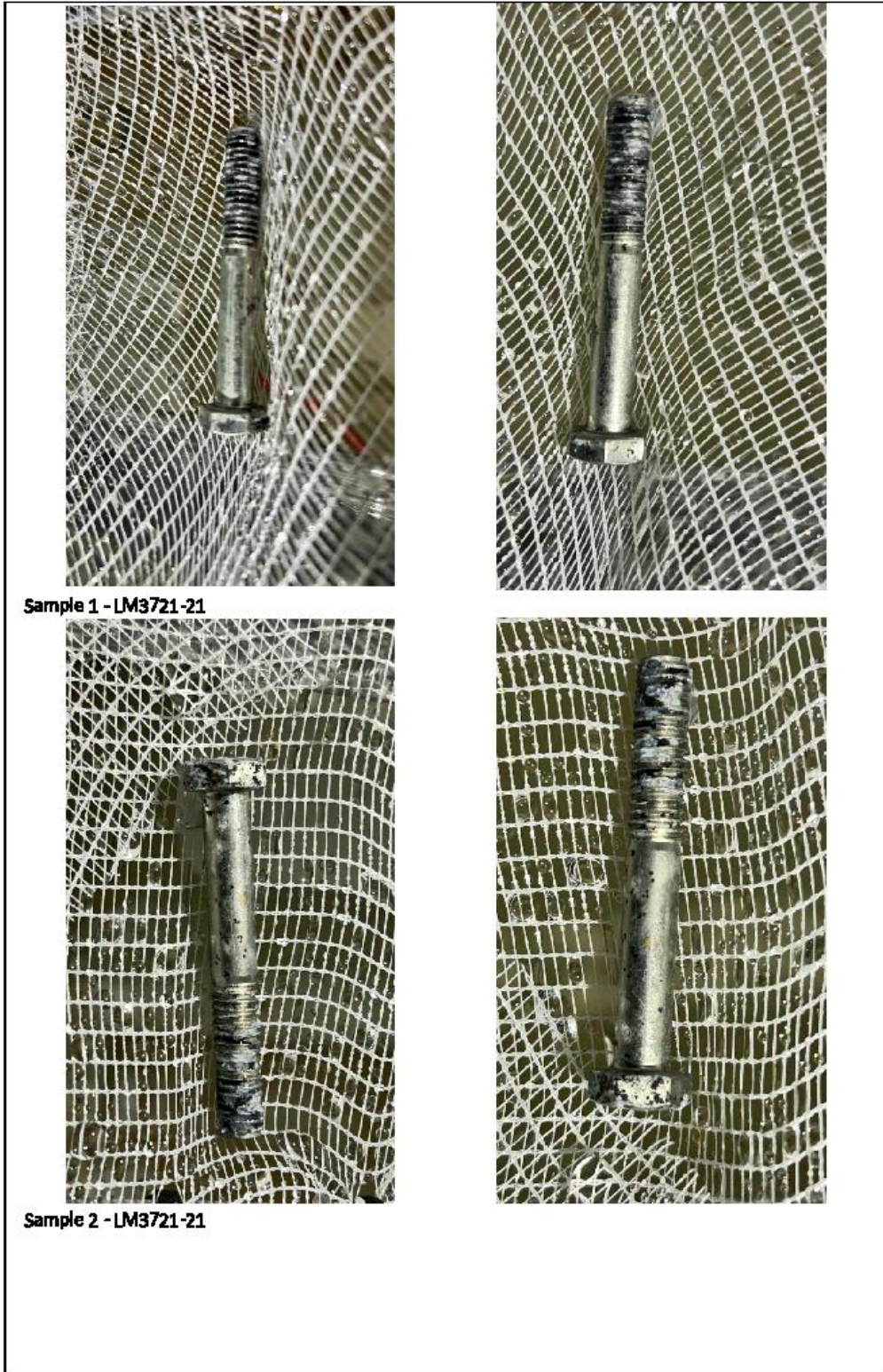
**Sample 1 - LM3514-09**



**Sample 2 - LM3514-62**



**Sample 3 - LM351473**



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**Sample 3 - LM3721-21**



**Sample 4 - LM3721-21**



**Sample 5 - LM3721-21**

**Results of the 5th Inspection**



**Sample 1 - LM3514-09**



**Sample 2 - LM3514-62**



**Sample 3 - LM351473**



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**Sample 3 - LM3721-21**



**Sample 4 - LM3721-21**





**Sample 5 - LM3721-21**

**Results of the Seventh Inspection – Final Inspection**



**Sample 1 - LM3514-09**



**Sample 2 - LM3514-62**



**Sample 3 - LM351473**



**Metallic coated sheets removed from the salt spray chamber**



**Sample 1 - LM3721-21**



**Sample 1 - LM3721-21**



**Sample 2 - LM3721-21**



**Sample 2 - LM3721-21**



**Sample 3 - LM3721-21**





**Sample 3 - LM3721-21**



**Sample 4 - LM3721-21**



**Sample 4 - LM3721-21**



**Sample 5 - LM3721-21**



**Sample 5 - LM3721-21**



**Steel bolts after removal from the salt spray chamber**

# APPENDIX B

## FINDINGS

When an interlaboratory comparison is conducted, findings are derived from the evaluation of practices, procedures, and results reported by all participating laboratories.

Any identified differences in the application of the test method may be documented in this report.

Where unsatisfactory or discrepant results are identified, participating laboratories are expected to address the relevant areas for improvement to ensure compliance with the applicable standard (ISO 9227) and to maintain the reliability of future results.

Laboratories are therefore requested to implement appropriate corrective actions to enhance their performance in subsequent rounds.

The following differences were observed for participant **code 21**:

| Clause | Laboratory <b>CODE 21</b>                              | Most participants <sup>(*)</sup>  |
|--------|--|---|
| ( h )  | Rinsed with water, without removing corrosion products | Removed corrosion residues by chemical cleaning according to ISO 8407 (Table A.1) |

<sup>(\*)</sup> Participants with insufficient performance are excluded from the evaluation.

The findings described above refer exclusively to observed differences among the results submitted by participants. They do not imply, in any way, that the participant’s result is directly attributable to these differences.

The participant is expected to conduct an internal analysis of any deviations that may have occurred during testing and to take appropriate corrective measures.

**----- END OF REPORT -----**