INTRODUCTION

With more than 30 years of accumulated experience in large-scale touring and permanent outdoor installations, L-Acoustics has a proven track record in delivering premium products with lasting performance. For all our loudspeaker products, we offer an elevated level of weather resistance as standard, removing the need for bespoke secondary finishes. The aim of this document is to provide information to assess L-Acoustics products weather protection.

PRODUCT PROTECTION RATINGS

<table>
<thead>
<tr>
<th>Loudspeakers</th>
<th>Reference</th>
<th>IP Rating</th>
<th>UV Rating</th>
<th>MIL-STD-810G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short throw - X Series</td>
<td>X4i</td>
<td>55&lt;sup&gt;1&lt;/sup&gt;</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>5XT</td>
<td>30</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>X8 / X12 / X15 HiQ</td>
<td>43</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td>Short throw - P Series</td>
<td>10BP / 112P / SB15P</td>
<td>30</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Medium throw - S Series</td>
<td>Syva</td>
<td>54</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Syva Low / Syva Sub</td>
<td>55</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Medium throw - A Series</td>
<td>A10(i) Wide / A10(i) Focus</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>A15(i) Wide / A15(i) Focus</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td>Long throw - K Series</td>
<td>Kiva II</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Kara II(i)</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>K3</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>K2</td>
<td>55</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K1</td>
<td>43</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K1-SB</td>
<td>45</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Subwoofers</td>
<td>SB15m</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>SB18(i/m)</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>SB28</td>
<td>55</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>KS21(i)</td>
<td>55</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>KS28</td>
<td>55</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> With connector sealing plate

<sup>2</sup> Products have not been submitted to MIL-STD-810G tests yet

<table>
<thead>
<tr>
<th>Electronics</th>
<th>Reference</th>
<th>IP Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplified Controllers</td>
<td>LA2Xi</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>LA4X</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>LA8</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>LA12X</td>
<td>20</td>
</tr>
<tr>
<td>Processors</td>
<td>P1</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>L-ISA Processor</td>
<td>20</td>
</tr>
<tr>
<td>Networking</td>
<td>LS10</td>
<td>30</td>
</tr>
</tbody>
</table>
Our product ratings are based on internationally recognized testing standards described below:

**IEC 60 529 - IP Ratings**
The IEC 60 529 published by the International Electro-technical Commission (IEC) relates to loudspeaker protection against solid foreign objects and water using a two-digit metric. The first character describes the degree of protection against solid objects on a scale from 0 (not protected) to 6 (dust-tight). The second digit describes the degree of protection against water on a scale from 0 (not protected) to 8 (submersion in water).

Enclosure ratings are determined in configurations with the front of cabinet in a neutral tilt angle. To ensure durability, upward tilt angles should be avoided on loudspeakers permanently installed without external protection. At L-Acoustics, a specific seal is applied to the NL4 speakerON connectors to reach a higher IP rating as standard on all loudspeakers fitted with speakON connectors.

**ISO 105-B01 - UV Ratings**
The ISO 105-B01, published by International Organization for Standardization (ISO), relates to colour fastness of textiles. The UV rating describes the color fastness of textiles to daylight, on a scale from 1 (very extensive fading) to 8 (no fading). A rating of 6 indicates very good resistance to daylight (slight fading).

* The ISO 105-B01 applies to textiles only, thus the UV rating provided is given for the Airnet fabric, which is the weakest element to colour fastness.

**MIL-STD-810G**
The MIL-STD-810G is a set of test methods published by the US Department of Defense to evaluate the long-term outdoor durability of a given enclosure. At L-Acoustics, we conduct specific MIL-STD-810G tests on loudspeakers as part of the development process. These tests assess the long-term resistance of loudspeakers to extreme temperatures, humidity, solar radiation and corrosion. Below is a description of these tests:

- **High temperature for storage conditions (Basic Hot A2 and Hot Dry A1):** Product is enclosed in a sealed chamber and subject to the following 24-hour climatic stress cycle: 63°C/145°F (44% HR) and 71°C/ 160°F (0% HR).

- **High temperature for operating conditions (Basic Hot A2 and Hot Dry A1):** Product is enclosed in a sealed chamber and subject to a temperature of 50°C/122°F (95% HR) for 24 hours.

- **Low temperature for storage conditions:** Product is enclosed in a sealed chamber and subject to the following 24-hour climatic stress cycle: 25°C/77°F (-13% HR) and 25°C/77°F (25% HR).

- **Low temperature for operating conditions:** Product is enclosed in a sealed chamber and subject to a temperature of -5°C/23°F (20% HR) for 24 hours.

- **Humidity in aggravated cycle (warm humid atmosphere):** Product is enclosed in a sealed chamber and subject to the following 5-day climatic stress cycle: 95% HR at 30°C/86°F to 60°C/140°F.

- **Solar radiation:** Product exterior materials are enclosed in a UV machine exposing intense UV of 800 W at 50°C/122°F for 10 days. Only very slight color deviation is allowed after the test.

- **Salt spray:** Product is submitted to continuous spray of a solution based on water with 5% of salt, prepared according to ISO 9227 norm, for 48 hours. This test assesses atmospheric and galvanic corrosions.

**Compliance results:**
According to MIL-STD-810G, a product passes the tests above and thus obtain a self-certification if it “functions properly” after being tested. While this can be understood in various ways by manufacturers, L-Acoustics ensures that products pass internal quality control tests. This means that products reproduce identical acoustic performance (bandwidth, output, THD…) and are free of any mechanical or physical degradation.
By design and choice of premium materials all L-Acoustics loudspeaker systems offer very-high weather resistance as standard.

**Enclosure**

L-Acoustics exclusively uses class 3 exterior grade beech and birch plywood following the EN 314 norm and class D4 exterior grade glue following the EN 204 norm. The base coating is a bi-component polyurethane. The top coating is a mono-component waterbased polyurethane that ensures optimized UV stability and scratch protection. L-Acoustics has chosen polyurethane for the following reasons:

- Greater UV resistance and high color stability vs. epoxy resins.
- Greater resistance in humid environments and less brittle vs. fiberglass.

**Grills**

All grills are coated with anti-corrosion black coating following the ISO 9227 norm for salt spray tests and norm ISO 11341 for UV protection. Grills are covered with Airnet fabric with a UV protection rating of 6 following the ISO 105-B01 norm.

**Hardware**

The primary design priority for rigging hardware is mechanical safety. Therefore, rigging is manufactured from high tensile steel (Yield strength > 700MPa) following the EN10149-2 norm. We exclude the use of aluminum for these sensitive parts. Other hardware is manufactured from standard steel (Yield strength > 170MPa). Both materials are treated with a dual anti-corrosion coating (zinc-based coating). All hollow bodies are treated in cataphoresis\(^1\). Mounting hardware (screws and fasteners) uses stainless steel.

\(^1\) Cataphoresis: process of electro-coating metals to elevate resistance to atmospheric agents.

**Components**

L-Acoustics selects transducers with the highest protection available from its suppliers with a water-resistant surface coating on both sides.

**Connectors**

Install-specific loudspeakers feature recessed terminal connectors covered by a sealed connector plate with gland nut connectors. An optional sealed 5 meter cable (H07-RN-F) connector with gland nut connectors is also available for Kara/Karai, Kiva II, ARCS WIFO, X8, X12, SB18/SB18i and SB15m.

**Fire-retardant**

Compliance with IEC 60065 or IEC 62368-1 standards ensures that the product will not be the cause of a fire start, thanks to the appropriate design and the use of fire-retardant material.

**Atmospheric conditions**

Loudspeakers are tested and optimal performance are assured under the following operating conditions:

- Temperature: -5°C/23°F to 50 °C/122°F
- Humidity: up to 95% HR (humidity)
**Grills**
- Anti-corrosion black coating following the ISO 9227
- Airnet Fabric with a UV protection

**Components**
- Water-resistant surface coating on both sides

**Hardware**
- Dual anti-corrosion coating

**Mounting hardware**
- Stainless steel with black coating

**Enclosure**
- Class 3 exterior grade beech and birch plywood
- Bi-component polyurethane coating
- D4 exterior grade glue

**Cable connectors**
Sealed connector plate with gland nuts
GENERAL ATMOSPHERIC CONSIDERATIONS

In general, loudspeakers performance and durability can be impacted by harsh atmospheric conditions. L-Acoustics loudspeakers offer optimal performance under the static or variable operating conditions mentioned below:

- Temperature: -5°C/23°F to 50 °C/122°F
- Humidity: up to 95% HR (humidity)

In very low temperatures (below 0°C), it is recommended to start operating loudspeakers at a low level and gradually increase this level. For permanent installations where temperatures are very low for a long period, it is recommended to operate loudspeakers at a very low level continuously to maintain components in proper conditions and ensure durability.

In very high temperatures (above 35°C), it is recommended not to operate the loudspeakers continuously at limiting levels.

STANDARDS REFERENCE IN THIS DOCUMENT

EN314: Plywood – bonding quality and durability. Classifies plywood by its bonding quality only (type of glue and core veneer quality). From Class 1 (interior conditions) to Class 3 (fully exposed conditions).

EN204: Adhesives - durability. Classifies wood glues for non-structural applications. From D1 (interior area) to D4 (exterior areas exposed to weather).

ISO 9227: Corrosion tests in artificial atmospheres – Salt spray tests

ISO 11341: Paints and varnishes – Artificial weathering and exposure to artificial radiation – Exposure to filtered xenon-arc radiation.

ISO 105-B01: Textiles – Tests for colour fastness – Colour fastness to light: Daylight. From 1 (extensive fading) to 8 (no fading).

IEC 60 529: Degrees of protection provided by enclosures (IP Code).

EN 10149-2: Hot rolled flat products made of high yield strength steels for cold forming - Part 2: Technical delivery conditions for thermomechanically rolled steels