

## **Certification of laser service providers for the use of ARA-LT® - laser films**

The company Ara-Coatings GmbH & Co. KG has developed a technology a few years ago which is offered under the trademark ARA-LT®. With this technology, many inorganic materials, e.g. metals, can be transferred by using standard marking lasers. The laser transfer of material from plastic carrier films (PET) to various product surfaces is quickly and cost-efficient – selective or even homogeneous on larger areas.

To achieve the required result, it is necessary to meet certain conditions and – most important - to use the correct laser parameter settings.

It is extremely difficult to accomplish when using this technology for the first time – especially because "Nano-effects" occur during laser marking that are not fitting with the experience and "common sense" of conventional laser marking. Therefore, a systematic adjustment and optimization of the laser parameter settings "on your own" is initially almost impossible and it requires a long time and effort to achieve high quality laser transferred coatings.

As a result, failures are often unavoidable when self-directed trials are made to laser PVD coatings on products, even with the acquired ARA-LT® films. The damage that this would cause for both, the customer and for Ara-Coatings, can be only avoided completely, if either the laser itself is set up by Ara-Coatings for a given marking or the laser user himself is trained to do so, that enables independent and successful application of the various ARA-LT® films – both of which are documented by a certification (issued by Ara-Coatings).

## Aims

- a) Conditioning and adjustment of the marking laser for the successful transfer of one or more laser-transferable PVD layers from the PET carrier film to one or more defined product surfaces by Ara-Coatings.
- b) Training of the laser service provider to work independently with ARA-LT® films for its own.
- c) Preparation of a laser manual to describe the procedure of the correct PVD-transfer of ARA-LT® markings or coatings onto defined substrate surfaces.
- d) Independent production of defined test samples in good quality by the laser service provider itself.
- e) Hand out of a certificate by Ara-Coatings.

## Requirements

- a) The laser is basically suitable for the intended application (i.e., it can be a fiber, MOPA or YAG laser with a power between 5 and 20 W).
- b) The laser service provider has to order the certification in writing.
- c) The laser service provider grants Ara-Coatings the right to recommend the laser service provider's company orally or in writing to their own customers.
- d) The laser to be certified has to be accessible for an expert of Ara-Coatings for a period of at least 1-2 days.

Alternatively the laser can be installed at Ara-Coatings for a certain time.

## Content and process of certification

1. Ara-Coatings receives technical information about the laser that is intended for certification.
2. The basic suitability of the laser device for ARA-LT® is determined by Ara-Coatings.
3. Determining, which ARA-LT® layer / material surface combination(s) is/are to be certified.
4. Option 1: The laser has to be installed at Ara-Coatings.

Option 2: The adjustment of the laser parameter settings has to be proceed by the laser service provider itself.

Option 3: The certification takes place at the location of the laser service provider, but is to be done by an expert from Ara-Coatings.-

#### 5. Proceeding of the certification:

- Preparation of substrates and films (as defined by Ara-Coatings), definition of a positioning procedure, adjustment and optimization of the laser parameter settings by Ara-Coatings.
- Teaching of the laser service provider.
- Independent production of test samples by the laser service provider as specified by Ara-Coatings.
- Examination of the optical, mechanical, chemical and thermal properties of laser transferred markings or coatings according to the following criteria:
  - Overall visual impression
  - Homogeneity of the lasered layer surface (assessment with a magnifying glass)
  - Opacity (on glass substrates)
  - contour sharpness (assessment with a magnifying glass)
  - Electrical conductivity
  - Abrasion, corrosion and chemical resistance, adhesion and thermal stability according to the enclosed document "Standard Tests on Ara Coatings" (Annex A).
- Evaluation of the results, documentation of the work and issuance of the certificate (after the tests have been passed).

**Important:** It cannot be guaranteed in advance that a certification will be successful. If a certificate cannot be given, Ara-Coatings commits itself to keep this fact secret.

## Questions and Answers

### **1. What is my benefit as a laser service provider of this certification ?**

In many different business areas, the interest in ARA-LT® films is currently growing rapidly – especially when glass and ceramic surfaces are to be marked, or when e.g. specific functionalities such as very good electrical conductivity are required. It is not the business model of Ara-Coatings to provide markings as a service or on mass scale, but Ara-Coatings frequently gets such requests for the marking itself, in addition to requests for ARA-LT® films. In this case, these requests will be forwarded directly to the certified laser service provider.

The laser service provider receives a clear competitive advantage through this ARA-LT® certificate: He can offer his customers a new process with completely new, widely spread possibilities.

### **2. What does the certification cost?**

This depends, among other things, on what exactly should be certified (for example, whether it is about one or more substrates or ARA-LT® films).

After clarification of the requirements, a specific quotation will be prepared.

### **3. What can be certified?**

Basically, the ARA-LT® standard films come into consideration – in combination with the recommended substrates (= material surfaces) as written below. The substrates are defined by Ara-Coatings.

Currently, the following ARA-LT® standard films are available:

- ARA-LT® “Gold“ (Art.-no.: 2.01.101.00 – A2)
- ARA-LT® “Gold+“ (Art.-no.: 2.01.101.00 – A3)
- ARA-LT® “Silver“ (Art.-no.: 2.02.102.00 – A2)
- ARA-LT® “Aluminium“ (Art.-no.: 1.00.108.00 – A1)
- ARA-LT® “Chrome“ (Art.-no.: 1.00.106.00 – A1)
- ARA-LT® “Steel“ (Art.-no.: 1.00.507.00 – A1)
- ARA-LT® “Grey“ (Art.-no.: 1.00.105.00 – B1)
- ARA-LT® “Black“ (Art.-no.: 2.00.804.00 – A1)
- ARA-LT® “Hi-Con“ (Art.-no.: 3.01.409.00 – A2)  
(for electrically conductive thin lines and  
electrical circuits)

Substrates on which these standard layers can be applied are e.g. glass, ceramics, porcelain, and marble.

The lists of standard films and substrates are continuously expanded and can be sent on demand.

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## Annex A: Standard tests at Ara-Coatings for ARA-LT<sup>®</sup> films

<b>Company / Order Number:</b>	<b>Coating System:</b>	<b>Approval:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Substrate / Product:</b>	<b>Description:</b>	<b>Date:</b> <b>Identification Code:</b> <b>Signature:</b>

<b>Test Procedure [Criteria]</b>	<b>Result</b>	<b>Comments</b>	<b>Date / Employee</b>
<b>Visual Impression</b> Optical Test <i>[color homogeneity]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		
<b>Visual Impression</b> Loupe / Microscope <i>[intensity, contrast, edge sharpness]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		
<b>Adhesion I</b> Tesa-Tape-Test (Tesa-no: 4651) <i>[layer delamination]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		
<b>Adhesion II</b> Cross-Cut-Test (DIN EN ISO 2409) + Tesa-Tape-Test (Tesa-no: 4651) <i>[layer delamination]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		

<b>Test</b> <b>Procedure</b> <i>[Criteria]</i>	<b>Result</b>	<b>Comments</b>	<b>Date / Employee</b>
<b>Abrasion</b>  Selective wiping with a standard sponge, rough side (10x, with a power of 500 g)  <i>[layer delamination]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		
<b>Thermal Resistance</b>  Storing the coated component in the oven for 1 h :  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 60 °C          150 °C          400 °C <i>[layer changing]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		
<b>Resistance to tap water</b>  Storing the coated component in tap water (RT, for 24 h)  <i>[layer changing or delamination]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		
<b>Resistance to cleaning agent</b>  Storing the coated component in PRIL-Original® dishwashing agent (pH ~ 7, for 24 h)  <i>[layer changing or delamination]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		
<b>Corrosion Resistance</b>  Storing the coated component in a climate chamber  (40 °C, 100% RH, for 24 h)  <i>[layer changing or delamination]</i>	<input type="checkbox"/> OK <input type="checkbox"/> not OK		