

Certification of marking lasers 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) Setting up a specific 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) Preparation of an application description for the correct lasering of the PVD layer(s) for customers.
- c) 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 equipment manufacturer has given his agreement to the certification.
- c) The laser device manufacturer grants Ara-Coatings the right to recommend the certified laser device to its own customers either verbally or in writing.
- d) The laser equipment manufacturer assures that it is planned to offer the laser devices of the same type and design in the market at least 2 years after submission of the approval for certification.
- e) The laser device to be certified should be accessible for an expert of Ara-Coatings for a period for at least 1-2 days. The laser can be sent to and installed at Ara-Coatings or – alternatively – a specialist from of Ara-Coatings gets access to the laser.

Content and process of certification

- 1. Ara-Coatings receives technical information on the laser that is intended for the 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 is to be set up.
- 4. a) Option 1: The laser has to be installed at Ara-Coatings
b) Option 2: The certification takes place at the location of the laser manufacturer or customer.

In this case a quotation has to be prepared by Ara-Coatings first.

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 as well as preparation of test samples.
- Documentation of the positioning information and the laser parameter settings used and shipping the ARA-LT® film(s) to the laser manufacturer.
- Preparing of test samples by the laser manufacturer and using another laser, but of the same type by using the information about the parameter settings as received from Ara-Coatings and sending of these test samples to Ara-Coatings.
- Testing the optical, mechanical, chemical and thermal properties of the markings or coatings as lasered at Ara-Coatings and those from the laser manufacturer 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, adhesive strength, and thermal stability in accordance with the enclosed document "Standard-Tests by Ara-Coatings" (Annex A).
- Issuance of the certificate by Ara-Coatings after the tests have been passed (see Annex A) and after an agreement from the laser manufacturer was signed, that Ara-Coatings is allowed to promote the laser device to its own customers and interested companies.

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 manufacturer of this certification ?

- In many different business areas, the interest in our 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.
- Many interested parties are not only looking for suitable markings for their products, but also one or more lasers at the same time. In these cases, the certified lasers will be recommended by Ara-Coatings: **A “turn-key solution” is always a very good selling point.**

Ara-Coatings initiate the direct contact between laser equipment manufacturer and the potential customer immediately.

- The laser manufacturer receives the certificate and, on request, labels that can be attached to the laser device, thus ensuring its customers a variety of additional applications with his laser.

2. What does the certification cost?

One of the two options can be selected:

- a) The laser has to be installed at Ara-Coatings for at least two weeks. Ara-Coatings undertakes to carry out the certification process for at least two film / substrate combinations - free of charge, when these combinations are determined by Ara-Coatings (only the shipping to and from Ara-Coatings has to be paid for).

In case that the laser manufacturer chooses the combinations or when further film / substrate combinations are requested, then a detailed quotation will be send in advance.

- b) If the certification is intended to take place at the location of the laser manufacturer, the modalities have to be clarified first and then a detailed quotation will be send.

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 thin electrically conducting lines and electrical circuits)

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

The list of standard films and substrates is continuously expanded and will be sent on demand.

Annex A: Standard tests at Ara-Coatings for ARA-LT® films

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

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

Test Procedure <i>[Criteria]</i>	Result	Comments	Date / Employee
Abrasion 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		
Thermal Resistance 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		
Resistance to tap water 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		
Resistance to cleaning agent 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		
Corrosion Resistance 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		