

### Preliminary remarks

The following are general instructions for applying ORAGUARD® Stone Guard protective films to vehicles.

### Service Life

The service life specified in the technical data sheets represents the maximum service life for vertical outdoor exposure under normal central European environmental conditions.

The following table provides an overview of the expected reduction in maximum service life under deviating environmental conditions and orientations. Applications with a deviation from the vertical level of more than 10° are considered horizontal applications.

The assessment of the maximum service life is based on the information in the technical data sheet for each series.

<b>Climate zone 1:</b> Albania, Andorra, Belgium, Bosnia and Herzegovina, Bulgaria, Denmark, Germany, Ecuador, Estonia, Finland, France, Georgia, Ireland, Iceland, Italy, Kosovo, Croatia, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Moldova, Belgium, Montenegro, the Netherlands, Norway, Austria, Poland, Romania, Russia, San Marino, Sweden, Switzerland, Serbia, Slovakia, Slovenia, Czech Republic, Ukraine, Hungary, USA (no deserts), Vatican City, United Kingdom, Belarus	<b>Climate zone 2:</b> Afghanistan, Angola, Equatorial Guinea, Armenia, Azerbaijan, Australia (no deserts), Bahamas, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Chile, China, Costa Rica, Dominica, Dominican Republic, El Salvador, Ivory Coast, Fiji, Gabon, Gambia, Ghana, Grenada, Guatemala, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Jamaica, Japan, Cambodia, Cameroon, Cape Verde, Caribbean Islands, Kazakhstan, Kenya, Kyrgyzstan, Colombia, Congo, Laos, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Micronesia, Mozambique, Myanmar, Panama, Papua New Guinea, New Zealand, Paraguay, Peru, Philippines, Portugal, Puerto Rico, Rwanda, Zambia, Samoa, San Marino, São Tomé and Príncipe, Senegal, Sierra Leone, Zimbabwe, Singapore, Spain, Sri Lanka, South Africa, South Korea, Suriname, Swaziland, Tajikistan, Taiwan, Tanzania, Thailand, Togo, Trinidad and Tobago, Turkey, Turkmenistan, Uganda, Uruguay, Uzbekistan, Venezuela, Vietnam, Central African Republic, Cyprus
<b>Climate zone 3: Dry / hot</b>  All deserts, exposed heights from 1000 m above sea level. Algeria, Ethiopia, Bahrain, Eritrea, Iraq, Israel, Yemen, Jordan, Qatar, Kuwait, Lebanon, Libya, Morocco, Mexico, Oman, Saudi Arabia, Somalia, Chad, Tunisia, United Arab Emirates	<b>Exceptions</b>  For service lives of ≤ 5 years in C1) vertical applications: C3) vertical = C2) vertical minus 50% C3) horizontal = C2) horizontal minus 50%

Climate zone 1* Temperate		Climate zone 2* Humid/warm		Climate zone 3* Dry/hot	
Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal
8.0	4.0	6.0	3.0	4.0	2.0
7.0	3.5	5.0	2.5	3.0	1.5
5.0	2.5	3.0	1.5	1.5	0.75

\* Maximum expected service life in years

**Note:** The information regarding maximum expected service life does not constitute a legally binding guarantee, warranty or other claim. The information provided is based on practical experience from artificial and natural weathering tests under normal conditions. It cannot be transferred to the maximum expected service life for every vehicle given the wide variety of possible influences (e.g. additional mechanical and chemical impacts).

The maximum expected service life for car wrapping applications is generally based on the data for horizontal application.

### Reduction of expected service life

Please be advised that a reduction in expected service life can occur in the following instances:

- When used on unsuitable substrates
- If the substrate has not been not sufficiently cleaned
- When exposed to high temperature and/or high humidity
- If the films are not cleaned regularly, e.g. if insects or bird droppings are not removed promptly
- At a high degree of air pollution, e.g. in industrial areas, in conurbations, or in large cities
- When exposed to high UV exposure, e.g. at high altitudes

### Storage and processing conditions

Roll stock of ORAGUARD® stone guard protective films must always be stored suspended or upright on the included roll supports in cool, dry places away from the sun. Before being processed, the self-adhesive films should be adapted to the moisture and temperature conditions prevailing in the processing premises. An indoor climate of 40% to 50% relative humidity and a temperature of +18° to +22° C is ideal. If the above-mentioned conditions are radically altered, dimensional changes of the protective paper may result. A consequence would be inadequate flatness of the self-adhesive material and dimensional deviations of the blanks. Specific storage directions given in the respective technical information must be observed.

### Procedure

To achieve an optimum result, thoroughly clean the base before applying the ORAGUARD®- stone guard protective film.

### Cleaning the base

The vehicle base should generally be cleaned with conventional cleaning agents. Do not use substances intended to form a coating or sealing layer by means of nanotechnology on the base to be cleaned.

- a) Clean the vehicle on the day before in a car wash tunnel (brush washing – no hand washing!)
- b) Thoroughly check surfaces and edges for residues of preservative wax or polishing agents and remove them with industrial cleaning agents or silicone remover (isopropanol alone is not effective).
- c) Finally, the surfaces to be bonded must always be cleaned with isopropanol. This will remove **most efficiently** all residues of previously used cleaning agents (spirit is not recommended).
- d) Thoroughly dry the vehicle, use hot air blower to remove any residual moisture, particularly moisture trapped under rubber seals.

### Note:

Solvent residues owing to improper cleaning or a recent paint job may result in blisters forming between the film and the base and affect adherence. Make sure that films are only bonded to completely dry and hardened coating finishes. As a rule of thumb, allow a minimum drying period of three weeks.

### Film bonding

ORAFOL recommends using only material of the same batch for application. If you want to use material from different batches anyway, the foreman should check whether any batch-related differences could affect the processing of the films and the result.

### Test bonding

After cleaning the vehicle and before each final bonding operation, it is absolutely necessary to make a bonding test and to check the final bonding strength of the film after 24 hours. For comparison purposes, we recommend to bond the film at the same time on an uncritical surface (such as a window pane). Should the bonding strength be too high and / or gas bubbles form, the above described cleaning procedure must be repeated. The same applies if the bonding strength is inadequate (for instance if the vehicle or vehicle parts were treated with agents marketed with reference to nano-sealing / coating or nanotechnology).

If the cleaning procedure was repeated, the above-described bonding test must be done again.

### Required tools

Bonding tools:

- Film squeegee with felt lip
- Film / paper knife or scalpel
- Hot air gun

### Processing conditions

- As a minimum requirement, the vehicle must have the bonding temperature recommended in the data sheet.
- Clean and dust free room, preferably with car lift or mounting ramp.
- Power connection

### Preparatory measures

- Measure vehicle parts and generously cut blanks.
- The film is trimmed when applied to the vehicle. If films of a width of up to 152 cm are used, many vehicles can be film-coated without any disturbing edges or overlaps.
- The edge to be cut is always the gap-width edge adjacent to the vehicle part to be bonded.
- The resulting excess length of film corresponding to the gap width should be folded over towards the interior area.
- Do not cut the films flush with the vehicle edges in order to avoid film shrinkage of and mechanical strain on open cut edges caused by cleaning brushes, airstream, etc.
- If the film still needs to be cut on the vehicle surface, put siliconised masking tape or similar material under the edge to be cut. After cutting, slightly raise the film to remove the masking tape before getting on with final bonding.

### Application method

In general, ORAGUARD® Stone Guard protective films shall be processed like calendared flexible PVC films. Generally, wet application is recommended, however experienced users may want to do dry application.

#### Wet application:

- Wet application should only be used during the warmer months of the year with temperatures from + 18° C so as to allow for the rapid evaporation of any residual moisture and to achieve the required bond strength.
- Spray the open adhesive side and the surface to be covered with film with low surface-tension water (water + detergent) or commercially available application fluid. Place the film on the surface to be bonded. The big advantage is that the blank can be easily positioned at this stage.
- Press down the film with overlapping wiping movements; make sure that water trapped between the base and the adhesive is completely pressed out.

- If the base to be bonded comprises sheet metal lap or butt joints, cut the film with a sharp cutter to prevent detachment of the film when the base moves.
- Any cloudiness of the adhesive developing after the application usually disappears after 3-5 days, i.e. once the residual moisture has evaporated and the adhesive has reached its ultimate bond strength. Depending on film thickness, ambient temperature, and relative humidity this process can take up to two weeks.

### **Dry application:**

- Position the film to be bonded on the vehicle and secure it with adhesive tape or film scraps.
- Make sure that the film projects about 5cm over the edges of the vehicle part to be bonded.
- Remove the backing paper and evenly stretch the film over the vehicle part.
- Press the film on to the vehicle with squeegee in even, far reaching wiping movements.
- For convex surfaces (such as mudguards) heat **large area** of film with a hot air gun. Keep a sufficient distance between the film and the hot air gun.
- Do not trim / fold over the edges before the film has cooled down.

### **After completion of the work**

The vehicle should be kept at the bonding temperature for at least another 24 hours. In case of dark bases, a light haze may persist. After about 3 days the film has reached its optimum ultimate bond strength so that the vehicle may be taken to a car wash with- out hesitation. Wait at least three weeks before treating film-coated surfaces with polishing agents. Only wax-free water-based plastic polishes should be used. Do not clean film-coated vehicles with high-pressure cleaners and caustic chemicals.

### **Removability**

The pre-condition for removing the film is a base and ambient temperature of not less than +20° C. Carefully remove the film at an edge by means of a knife and slowly peel it off at an angle of 180°. The use of a hot air blower considerably facilitates this operation. In case of very old films, adhesive residues may stay on the base, which are easily removed with adhesive remover.

These Processing Instructions are based on our know-how and experience. They do not comprise explanations of every aspect to be considered during film bonding. Specific know-how and skills of advertising technicians or bonding specialists are expected. Because of the wide range of factors influencing processing, bonding and use, we advise you to perform your own tests for special applications. A guarantee of specific properties cannot be derived from this information.

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ORAFOL Europe GmbH  
Orafolstrasse 1, D-16515 Oranienburg, Germany

Tel.: +49 (0) 3301 864 0, Fax: +49 (0) 3301 864 100  
graphic.innovations@orafol.de

