

### General requirements

Films for partial and full vehicle wrapping are high-quality, self-adhesive film products from ORAFOL Europe GmbH (hereinafter also referred to as "ORAFOL") designed for the temporary, decorative modification of a vehicle.

Please note that films are, by their nature, more delicate than paintwork. Accordingly, films must be treated with particular care during application as well as during care and cleaning. Our current application guidelines (available at: [www.orafol.com/gp/europe/de/support](http://www.orafol.com/gp/europe/de/support)) must be observed when handling ORAFOL® films (application and removal), as well as during their care and use. Otherwise, in our experience, the stated maximum durability in particular may not be achieved.

The application and removal of the films may only be carried out by qualified specialist personnel, i.e. trained and experienced signmakers or installers.

Improper or incorrect application or removal of the films, or the use of film types that are not suitable for the specific application, may damage the paintwork of the vehicle in question and/or significantly reduce the durability of the films.

### Durability

The expected durability stated in the technical data sheets refers to maximum durability values that can only be achieved through vertical outdoor exposure under normal Central European environmental conditions.

The following table provides an overview of the expected reduction in maximum durability under differing environmental conditions and film orientations, divided into three climate zones. Applications deviating by more than 10° from the vertical are deemed to be horizontal. The information applies to all ORAFOL colour and metallic films that may be used for both vertical and horizontal applications.

For digital printing media, the expected total durability applies exclusively to vertical applications. The total durability of combinations of digital printing media and laminate is assessed based on the information provided in the catalogue for digital printing media (available at: [www.orafol.com/gp/europe/de/support](http://www.orafol.com/gp/europe/de/support)).

<p><u>Climate zone 1:</u></p> <p>Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Ecuador, Estonia, Finland, France, Georgia, Germany, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Ukraine, United Kingdom, USA (excluding desert areas), Vatican City</p>	<p><u>Climate zone 2:</u></p> <p>Afghanistan, Angola, Armenia, Australia (excluding desert areas), Azerbaijan, Bahamas, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Caribbean Islands, Central African Republic, Chile, China, Colombia, Congo, Costa Rica, Cyprus, Dominica, Dominican Republic, East Timor, El Salvador, Equatorial Guinea, Fiji, Gabon, Gambia, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Ivory Coast, Jamaica, Japan, Kazakhstan, Kenya, Kyrgyzstan, Laos, Lesotho, Liberia, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Micronesia, Mozambique, Myanmar, Namibia, Nepal, New Zealand, Nicaragua, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Portugal, Puerto Rico, Rwanda, Samoa, San Marino, São Tomé and Príncipe, Senegal, Sierra Leone, Singapore, South Africa, South Korea, Spain, Sri Lanka, Suriname, Swaziland, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Turkey, Turkmenistan, Uganda, Uruguay, Uzbekistan, Venezuela, Vietnam, Zambia, Zimbabwe</p>
<p><u>Climate zone 3: dry / hot</u></p>	<p><b>Exceptions</b> Where the expected maximum durability is ≤ 5 years in C1)</p>

<p>All desert areas, exposed altitudes from 1,000 m above sea level and regions with extremely high UV exposure, Algeria, Bahrain, Chad, Egypt, Eritrea, Ethiopia, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Mexico, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Tunisia, United Arab Emirates, Yemen</p>	<p>vertical, the following applies:</p> <p>C3) vertical = C2) vertical minus 50%</p> <p>C3) horizontal = C2) horizontal minus 50%</p>
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Climate zone 1* temperate		Climate zone 2* humid / warm		Climate zone 3* dry / hot	
vertical	horizontal	vertical	horizontal	vertical	horizontal
12	6	10	5	8	4
10.0	5.0	8.0	4.0	6.0	3.0
8.0	4.0	6.0	3.0	4.0	2.0
7.0	3.5	5.0	2.5	3.0	1.5
6.0	3.0	4.0	2.0	2.0	1.0
5.0	2.5	3.0	1.5	1.5	0.75
4.0	2.0	2.0	1.0	1.0	0.50
3.0	1.5	1.0	0.5	0.5	0.25

\*Expected maximum durability stated in years

### Notes

As a general rule, no warranty, guarantee or other claims may be derived from the information on expected maximum durability. The values are based on empirical data from artificial and natural weathering tests under standard conditions and cannot be applied generally to the expected maximum durability for every vehicle, as the relevant influences, including additional mechanical and chemical stress, are more complex in this context.

For the overall assessment of the expected maximum durability of a full vehicle wrap, the values for expected horizontal durability must generally be used as the basis.

### Reduction in expected durability

A reduction in the durability of ORAFOL colour films is to be expected in the following cases, among others:

- Use on unsuitable substrates
- Insufficient cleaning of the substrate
- Permanent exposure of films to high temperatures and/or high humidity
- Films not being cleaned regularly, e.g. if insect residue or bird droppings are not removed promptly
- High levels of air pollution, e.g. proximity to industrial areas, conurbations or large cities
- High UV exposure, e.g. at high altitudes

### Preparatory measures

To achieve the best possible result, a number of preparatory measures must be carried out before applying film to the vehicle, as described below:



### Inspection of the vehicle surface

In terms of their adhesive chemistry and adhesive strength, films recommended for vehicle lettering or full vehicle wrapping are designed so that they do not lift vehicle paintwork that has been applied properly and is fully cured, or damage the paintwork.

These films should only be applied if the vehicle paintwork meets these quality requirements.

It must also be ensured that the paintwork of the vehicle in question meets OEM specifications. In case of doubt, please contact the vehicle manufacturer or a specialist paint shop before application.

The paintwork of the vehicle in question must not be damaged. This applies in particular to damage caused by rust, fire, scratches, stone chips, age-related embrittlement or similar defects.

Vehicle components may only be wrapped if the surface tension of the substrate is at least 38 dyn/cm.

To measure this value, we recommend using a surface tension test pen, e.g. YelloQuickStick from Yellotools.

For application to low-energy surfaces, we recommend using our films which are specially developed for this purpose.

### Selecting the film type

The next step is to determine the suitable film type for the planned application.

- a) For application to complex 3D geometries and riveted areas, with the advantage of excellent thermoforming properties:

Cast films

- b) For application to vehicles or vehicle parts with no pronounced 3D geometries:

Calendered films, structured films (Premium Structure Cast)

In case of doubt, please contact your specialist dealer.

Light colours and coloured metallic shades naturally have lower opacity than dark colours. As a result, films with light colours or coloured metallic shades may produce a different colour impression on dark substrates. In such cases, it must be clarified in advance whether the desired result can be achieved with the selected film.

### Checking the selected film

Check the selected film for visible defects before use. If visible defects are identified during the preliminary inspection, the film must not be used. In this case, please contact your specialist dealer.

We expressly point out that, once a film has been applied, subsequent complaints based on pre-existing defects can generally no longer be accepted.

Use only films from the same batch, identifiable by the batch number printed on the edge of the reverse side, for any one application. The use of films from multiple batches on a single object, or combined use with products from other manufacturers, is not permitted, as this may adversely affect application and the result.

An unapplied sample of the selected film (approx. 20 x 30 cm) with the complete reverse-side edge print must be archived for documentation purposes.

### Preparing the vehicle

Before application, the vehicle must be prepared as described below:

- a) The vehicle must be cleaned in an automatic car wash (not hand washed). Ensure that a wash programme without wax is selected. The vehicle must be completely clean and dry at the time of application.
- b) Remove all fittings that may obstruct the work (particularly exterior mirrors, door handles, trim strips, windscreen wipers, etc.).

- c) Check the vehicle surfaces and edges for residues of protective wax or polish. Any remaining residues of protective wax or polish must be removed using a silicone-free, citrus-based industrial cleaner only. Surfaces with stubborn contamination may also be cleaned using a commercially available insect or tar remover.
- d) As a general rule, do not use cleaning agents designed to create a nano-seal or nano-coating by means of nanotechnology on the surface to be cleaned. The manufacturer's instructions must be observed in this respect.
- e) Then clean all surfaces to which film is to be applied using ORAFOL® Pre-Wrap Surface Cleaner. Do not use methylated spirits for this purpose. Ensure that any remaining cleaning agent residues are removed thoroughly and completely.
- f) Finally, ensure that the vehicle surfaces, edges, channels, recesses and joints are completely dry. In particular, carefully remove any residual moisture from beneath rubber seals.

### Applying the films

Application is carried out under dry conditions.

For partial decorations (e.g. rally stripes) on flat and slightly curved surfaces, wet application is possible, but only for films without microstructured adhesive.

In general, films with microstructured adhesive (*RapidAir*®) and structured films (Premium Structure Cast) are not suitable for wet application.

### Tools required

The following tools are essential for the application:

Application tools:

- Film squeegee with felt edge (soft felts based on natural fibres are recommended)
- Film knife, paper knife or scalpel
- Magnets
- Hot-air gun
- Infrared thermometer

Basic tools:

- Torx set
- Allen key set
- Screwdrivers, various sizes
- Spanners, various sizes and/or ratchet set
- Combination and needle-nose pliers
- Rubber mallet

### Application conditions

- Apply the film (using a lifting platform or installation ramp) in clean, dust-free and well-lit rooms only.
- The vehicle surface to which the film is to be applied must have the minimum application temperature specified in the relevant data sheet for the selected film. The best possible result is achieved at temperatures of +21°C to +23°C on the vehicle surface to which the film is to be applied. The temperature on the vehicle surface can be determined easily using an infrared thermometer.

### Test application

After the preparatory cleaning of the vehicle (see section 4) and before each final application, a test application must always be carried out. Check the final adhesion of the film 24 hours after the test application. Repeat the preparatory cleaning (see section 4) if the film adheres too weakly and/or if air bubbles form beneath the film. It is advisable to carry out a simultaneous test application on non-critical substrates (e.g. a vehicle window) for comparison purposes.

The film may not adhere properly if the vehicle or vehicle parts were prepared using cleaning agents designed to create a nano-seal or nano-coating on the surface by means of nanotechnology.

In this case, the vehicle must be cleaned again as described in section 4, followed by a further test application.

For films with effect pigments, check the application direction. Do this by applying one test strip lengthwise and one crosswise in relation to the reverse-side print. If there is a visual difference, ensure that the direction of the reverse-side print is taken into account during application.

### Application process

#### Basic principles

High-performance cast films can be thermoformed into vehicle body channels. However, when applying film in pronounced recesses (e.g. sharp-edged channel geometries), the film must be formed into these areas, cut and overlapped.

Calendered films are suitable for flat and slightly curved surfaces. These film types must not be thermoformed into deep recesses in the vehicle body. In recesses and over rivets, the films must be formed into position, cut and overlapped.

Structured films (Premium Structure Cast): Due to the surface structure, this film type must not be subjected to excessive mechanical stress during application. In recesses and over rivets, this film type must be formed into position, cut and overlapped.

As a general rule, freshly printed solvent-based digital printing media should be left to dry for at least 72 hours, spread out either hanging or laid flat, regardless of the film type. The relevant information in the current application guidelines for digital printing media must be observed (available at: [www.orafol.com/gp/europe/de/support](http://www.orafol.com/gp/europe/de/support)).

UV digital printing is only suitable for 3D application to a limited extent. Once cured, the print is hard and brittle. As a result, the printed image may crack when applied to highly curved substrates or substrates with deep contours. This must be taken into account and a test application must be carried out before application.

Application to vehicle windows: Vehicle windows may only be covered with films that are type-approved in accordance with Section 22a of the German Road Traffic Licensing Regulations. To determine whether a film is approved for application to vehicle windows, please see the respective technical data sheets.

These films may only be applied to vehicle windows that are not relevant to the driver's field of vision. For this reason, application to the windscreen and the front door windows of a vehicle in particular is not permitted.

Rear-window application is permitted only if a second exterior mirror is present. Application to the window frame or window seal is not permitted, nor may the film be trapped in the window surround (see also the relevant General Type Approval [Allgemeine Bauartgenehmigung] – hereinafter "ABG"). A copy of the relevant ABG is available on request from: [graphic.products@orafol.de](mailto:graphic.products@orafol.de)

The enclosed label bearing the D-number of the type-approved film must be affixed to every vehicle window to which film is applied in such a way that the D-number can be read from inside the vehicle. In addition, a copy of the ABG must be carried in the vehicle.

### General application instructions

- Measure the vehicle parts to which film is to be applied in advance and cut the film to size with a little to spare. When cutting, avoid applications with overlaps and joins. Film widths of up to 152 cm allow application on many vehicles without visually disruptive joins or overlaps.
- The film is trimmed after it has been applied to the vehicle.
- Wherever possible, the cut edge should always be the panel gap adjacent to the vehicle part to be covered.
- Use the resulting film overhang (equal to the width of the panel gap) to fold the film around the edge towards the inside.
- In order to prevent shrinkage of the film as well as mechanical stress on exposed cut edges caused by car-wash brushes, airflow, etc., ensure that the film is not cut flush with the vehicle edge.
- The film must also be applied underneath rubber seals in order to avoid exposed edges.
- If the film has to be cut on the vehicle surface, the cutting edge must first be underlaid with siliconised masking tape. After cutting, slightly lift the film to remove the siliconised masking tape before final application.

### Application

- After cutting, position the film to be applied and secure it to the vehicle using adhesive tape or magnets.
- Ensure that the film extends approx. 5 cm beyond the edges of the vehicle part to which it is to be applied.
- Then remove the release liner from the film and stretch the film over the relevant vehicle part evenly.
- Squeegee the film onto the relevant vehicle part using even, broad sweeping movements.
- On curved substrates, e.g. wings, heat the film over a large area to a surface temperature of between +40°C and max. +60°C using a hot-air gun.
- To activate the adhesive quickly, all thermoformed areas, borders and edges must be carefully reheated after application using the hot-air gun. To ensure that the film assumes a permanent shape in channels, the film must then be heated in these areas to between +110°C and max. +120°C.
- Finally, trim or fold over the edges of the film, but only after the film has cooled down.
- After the previously removed vehicle parts have been refitted, heat all border areas, edges and channels again to between +110°C and max. +120°C using the hot-air gun. For films equipped with RapidAir® ProSlide technology, all surfaces must finally be reheated to +50°C using a hot-air gun or infrared lamp in order to make any remaining air bubbles visible and activate the adhesive.
- Further practical information on applying ORAFOL® films is provided in the video at: [www.orafol.com/gp/europe/de/support](http://www.orafol.com/gp/europe/de/support)

### Important notes

Use an infrared thermometer to measure the heating of the substrate accurately.

Keep the hot-air gun in constant motion during all work. Otherwise, there is a risk of damaging the film.

If small air bubbles with a diameter of less than 5 mm remain beneath the applied film, experience has shown that these will diffuse through the film within a few days to three weeks, depending on the ambient temperature.

Larger air bubbles must be pricked with a needle or sharp scalpel and the air then squeegeed out.

### Note on the visibility of the air-channel structure in films with RA+ structure

The ORACAL RA+ structure in the liner and adhesive of car-wrapping films was developed to significantly improve the repositionability of the films and thereby achieve easier and faster application results.

This structure differs from the ORACAL RA structure due to the rougher texture of the liner and therefore also of the adhesive surface. Accordingly, the structure is more visible after application and is therefore one of the fundamental product

characteristics. The visibility of the structure does not constitute a product defect but is due to the improved usability of the RA+ structure. Depending on the customers' or users' requirements, either the RA variant or the RA+ variant may be suitable. The customer or user must make this assessment themselves before starting the project.

For transparent films, it should be noted that films with an air-channel structure may appear cloudy immediately after application; this cloudiness will diminish over time and under the influence of heat.

### After completion of the work

After application, the vehicle must be kept at application temperature for at least a further 24 hours (see section 5.2).

Experience has shown that the film reaches its optimum final adhesion three days after application. The vehicle must not be driven through a car wash before this period has elapsed.

To avoid impairment of the film's durability, as well as any other negative effects on the film or vehicle caused by regular cleaning, the vehicle may be cleaned only by hand or in a textile car wash without a hot-wax programme (no brush wash) after this period.

As a general rule, ORAFOL recommends regular cleaning and care by hand using the ORACAL® cleaning and care products specially developed for full vehicle wrapping with ORAFOL® films, available as complete sets for gloss and matt film surfaces. The mild yet highly effective cleaning and care products included in these sets are precisely matched to the differing sensitivities of the film surfaces.

In addition, ORAFOL expressly recommends initial impregnation with ORACAL® Long-Term Sealant from the corresponding cleaning and care sets for gloss and matt film surfaces immediately after completion of the application work or before first use.

The surfaces of matt and/or structured films are naturally more sensitive than those of gloss and smooth films. Accordingly, these films must be treated with particular care during application as well as cleaning and care. In addition, depending on the duration and frequency of use, experience has shown that cleaning and care are required more frequently.

In our experience, cleaning a film-coated vehicle using high-pressure cleaners or aggressive chemicals and solvents, e.g. acetone or paint thinner, generally results in damage to the film and possibly also to the paintwork, or in reduced durability of the applied film, and must always be avoided. In case of doubt, please contact our customer support.

**The current care and usage conditions issued by ORAFOL® must be handed to the customer and explained upon delivery of the vehicle to which ORAFOL® films have been applied.**

### Removing the films

The films feature high-quality pressure-sensitive adhesives that provide permanent final adhesion. The possibility of adhesive residues remaining on the substrate after the film is removed cannot be ruled out. However, these can be removed using a silicone-free, citrus-based industrial cleaner. ORAFOL provides no guarantee or warranty as to the speed or ease of removal of the films.

A substrate and ambient temperature of at least +20°C is required for the films to be removable. The film should be carefully lifted at one corner with the aid of a knife and slowly peeled off at a 180° angle. The removal process can be made significantly easier by moderately heating the applied film to between +40°C and max. +60°C. The use of a commercially available steam cleaner is also recommended. The film's behaviour during removal is also significantly influenced by the type and condition of the substrate and by the conditions of use.

### Warranty information

Failure to comply with the application guidelines and care and usage conditions will exclude warranty and liability.

The durability of film applied to vehicles is largely determined by strict compliance with the application guidelines and the care and usage conditions. Films may only be applied and removed by qualified specialist personnel, i.e. trained and experienced signmakers or installers.



The qualified specialist personnel carrying out the work are responsible for the quality of the application. The owner of the film-coated vehicle is responsible for complying with the care and usage conditions. The information contained in these application guidelines is based solely on our current knowledge and experience. It does not constitute either an agreed quality or an assurance of specific properties, or a quality and/or durability guarantee with regard to our films. We do not cover the costs of removing an application.

**Warranty and liability are excluded in the following cases in particular:**

- New paintwork that is not fully dry or fully cured at the time of application
- Applications to unsuitable substrates (see also section 3.1) and to paintwork that has not been applied professionally
- Substrates that have not been prepared properly
- Use of ORAFOL® materials in combination with third-party materials
- Applications to a single object using films from multiple batches
- Products or product combinations not recommended for the intended application
- Improper or unprofessional applications carried out by installers who are not qualified
- Paint detachment during film removal and changes to the paintwork, e.g. "ghost images"
- Film detachment from sharp-edged angled channel geometries, which are often found on commercial vehicles such as delivery vans or panel vans

**Note:**

Most graphics are exposed to varying degrees of weathering; accordingly, loss of gloss and slight colour changes occurring over time do not constitute a product defect.

If you have any further questions regarding the application and removal of ORAFOL® films, please contact our customer support team.

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