



### Self-study Programme 531

## Paintwork New features

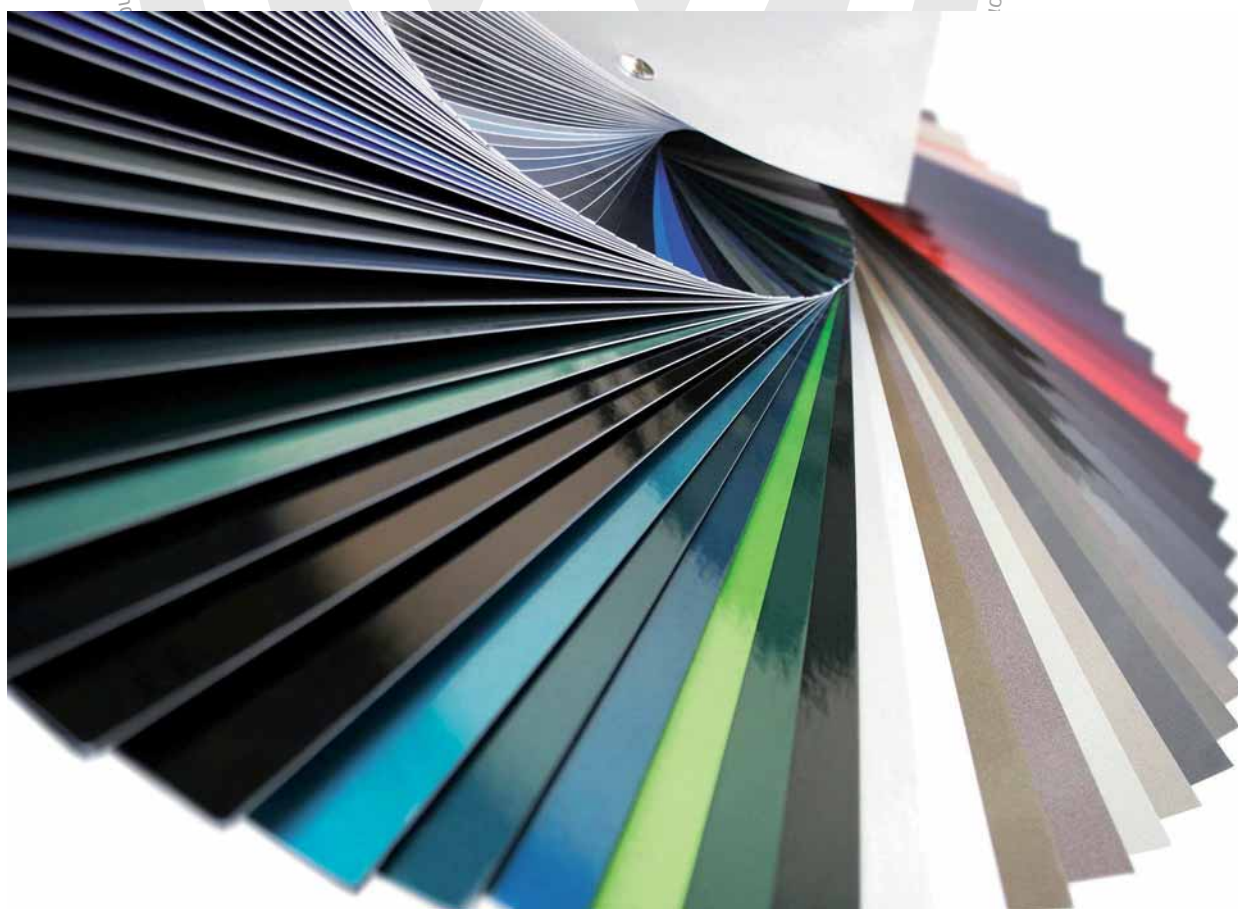


Like all technology, paint systems are constantly being improved.

Correct preparation and the use of the right materials are essential for high-quality paintwork.

Partial painting instead of painting a whole damaged panel can also make sense in order to provide economic repairs. Furthermore spot repairs are an option for minor damage and small repairs.

These topics are described in this Self-study Programme.



Volkswagen Group informs that only Volkswagen Genuine products or the paint supplier's products, which have been approved by the manufacturer, may be used for guarantee and warranty work in accordance with the manufacturer's instructions.

**The Self-study Programme shows the design and function of new developments.  
The contents will not be updated.**

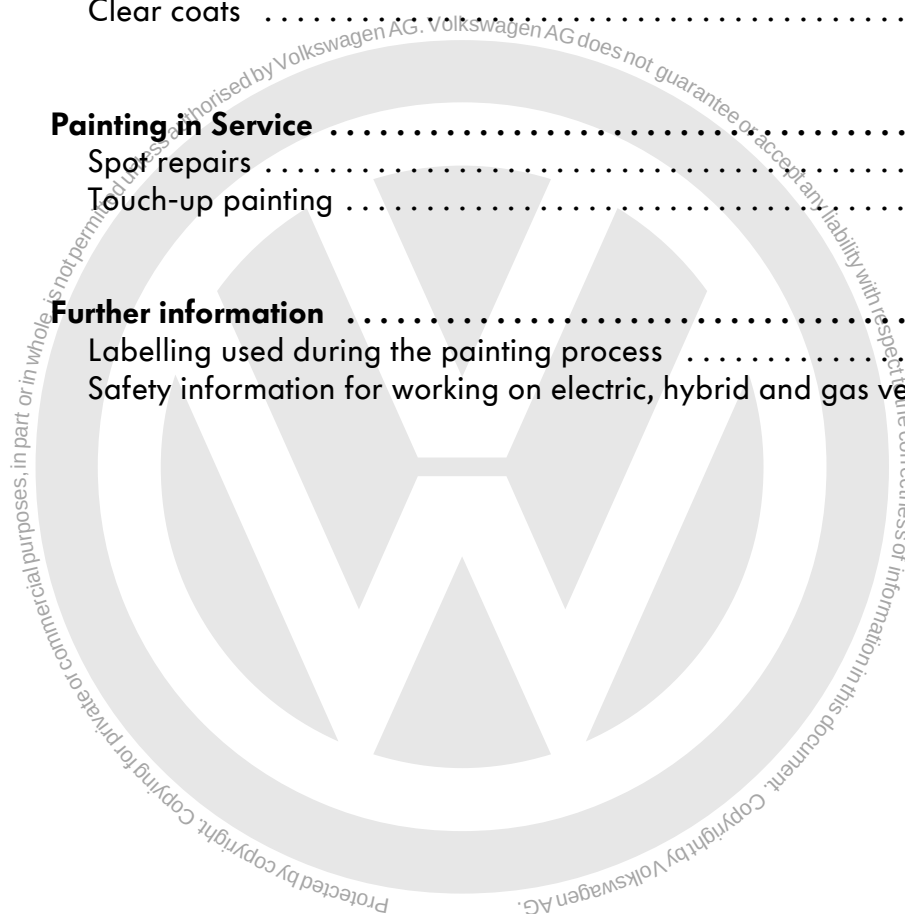
For current testing, adjustment and repair instructions, refer to the relevant service literature.



**Important  
note**

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# Preparations for painting

## Colour matching

A colour measuring device, e.g. “ColorFinder plus”, is a useful tool that allows you to determine a colour quickly and easily. It is used in conjunction with the “Wizard Plus” software. The software calculates the paint formula, which you can then mix using paint mixing scales.



S531\_062

## Procedure for colour matching

Before matching the colour, the surface being measured needs to be cleaned with silicone remover. You should then carefully polish the area.

Switch on the colour measuring device with the “Operate” button. If you do not use the device, it will switch off automatically after a short time.

Three measurements are required for each colour match. The measurements should always be made in the area of the damage. The ambient light is not important since the measuring device has LEDs.

To check the colour, we recommend painting a piece of sample metal with the calculated paint formula and comparing the colour with the paintwork on the vehicle.

## Daylight lamp

A defined source of light is required to judge a colour precisely. This allows the ambient light to be ruled out as an influencing factor. Otherwise the colour could turn out wrong.

Daylight lamps are used for this kind of measurement.



Colour sample sheets

Daylight lamp

S531\_059

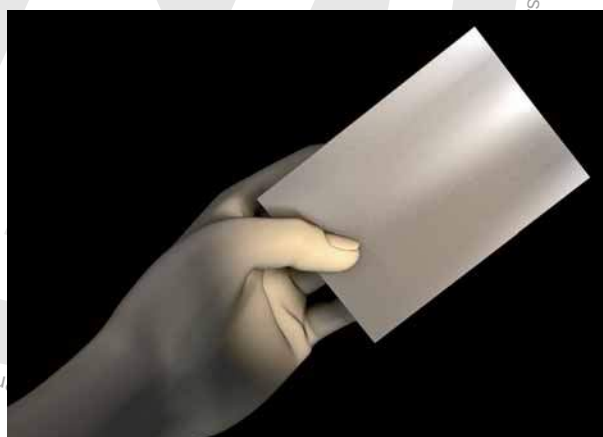
## Influencing the colour with different light sources

Daylight



S531\_004

Artificial light



S531\_005

# Preparations for painting

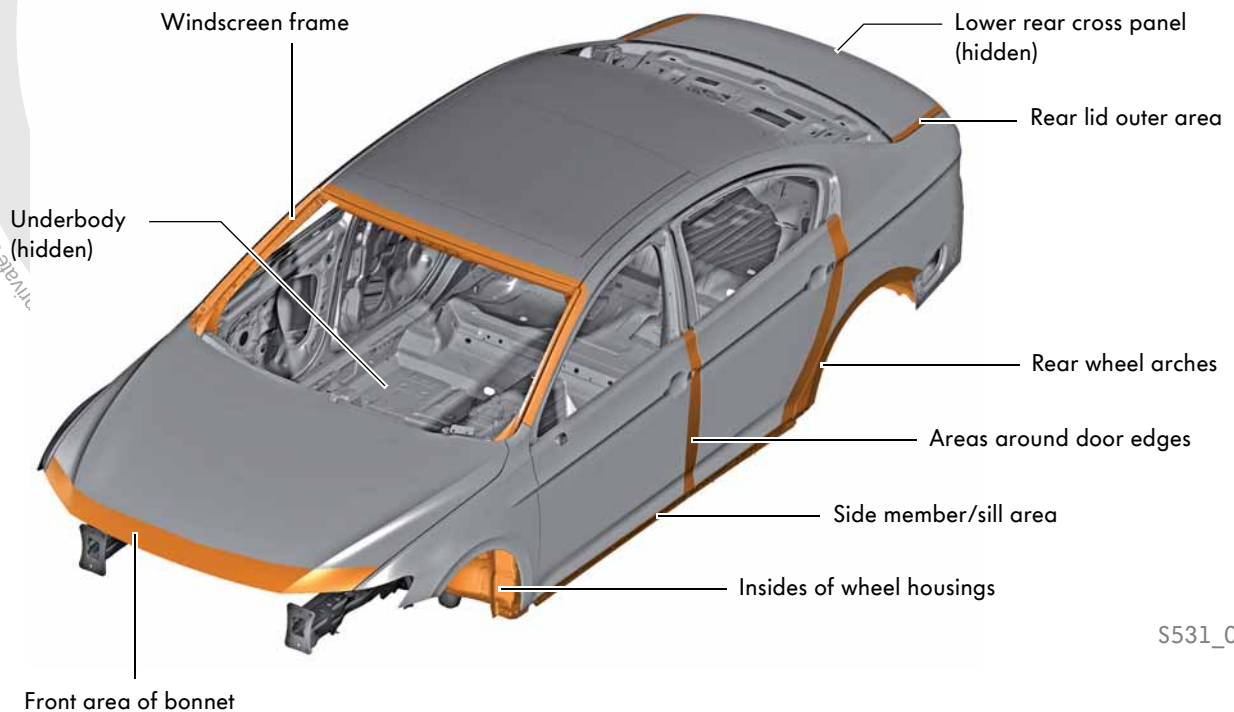
## Filling uneven areas

Any uneven areas need to be smoothed out to prepare them for painting. The first step is filling.

## Insulating before applying filler

Filler spray and polyester filler are hygroscopic. This means that they absorb moisture like a sponge. When applied to bare metal surfaces, the filler therefore needs to be insulated in rust-prone areas of the vehicle in order to retain the warranty against rust also after filling.

The following areas of the vehicle are considered to be prone to rust:



S531\_006



Only materials approved by Volkswagen may be used.  
You will find information about this in the latest paintwork manual.

## Replacing body parts

The anti-corrosion zinc coating is burnt away when you perform welding work on the body. That is why these areas also need to be insulated before filler is applied.

## Repairing corrosion damage

If filling work is necessary after corrosion has been removed, the filler generally has to be insulated.

## Insulating before applying filler

### Step 1: cleaning

Clean whole area for repair.



S531\_046

### Step 2: removing paint/sanding out transitions

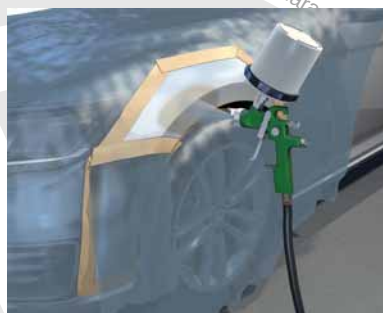
Sand off damaged paint. Sand transitions.



S531\_047

### Step 3: applying the surfacer

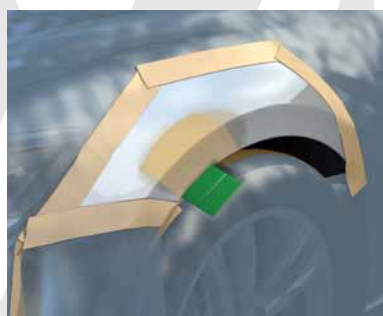
Insulate the sanded surface with "2K Wash Primer". Then apply "Performance Surfacer". The surfacer needs to be dry sanded once it has set. Surfacers will need to be applied again to any areas that have been sanded through to bare metal.



S531\_048

### Step 4: applying the filler

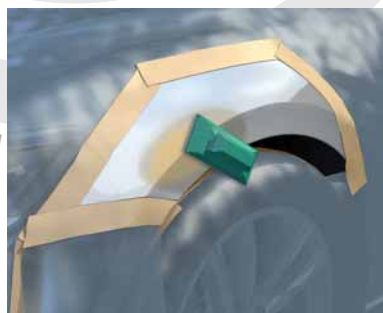
Apply the filler in thin layers.



S531\_049

### Step 5: sanding the filler

The filler needs to be dry sanded once it has set. If you sand any areas through to bare metal, they will need to be insulated again by applying the primer (return to step 3).



S531\_050

# Preparations for painting

## Applying filler

According to the manufacturer's instructions, different filler materials should be used depending on the surface.

### Two-pack steel filler for:

- Sheet steel
- General metallic surfaces
- Galvanised sheet steel

### Two-pack fine putty for:

- Sheet steel
- Sheet aluminium
- Glass fibre reinforced plastics
- Old paint and factory paint
- Hardened two-pack fillers/two-pack primers
- Plastic parts primed with two-pack plastic primer surfacer or primer so they are glazed (transparent)
- Surfaces prepared with two-pack polyester filler

### Two-pack elastic fine putty for:

- Sheet steel
- Galvanised sheet steel
- Sheet aluminium
- Cleaned and sanded plastics
- Glass fibre reinforced plastics
- Well sanded old paint or factory paint
- Hardened two-pack fillers/two-pack primers

### Two-pack spray putty for:

- Sheet steel that has been cleaned and sanded, primed with two-pack wash primer or one-pack wash primer and then insulated with two-pack high-solid surfacer.
- Zinc-electroplated/electrogalvanised steel sheets or aluminium
- Hardened, solvent-resistant, well-preserved and sanded factory paint or old paint
- Surfaces filled with two-pack polyester filler
- Abherent-free, cleaned and sanded glass fibre reinforced plastics

### Two-pack IR premium putty (infrared curing) for:

- Sheet steel
- Galvanised sheet steel
- Sheet aluminium
- Well-sanded factory paint or old paint
- Hardened, primed two-pack surfacers/two-pack primers
- Abherent-free, cleaned and sanded glass fibre reinforced plastics

### Two-pack diamond aluminium putty for:

- Sheet aluminium

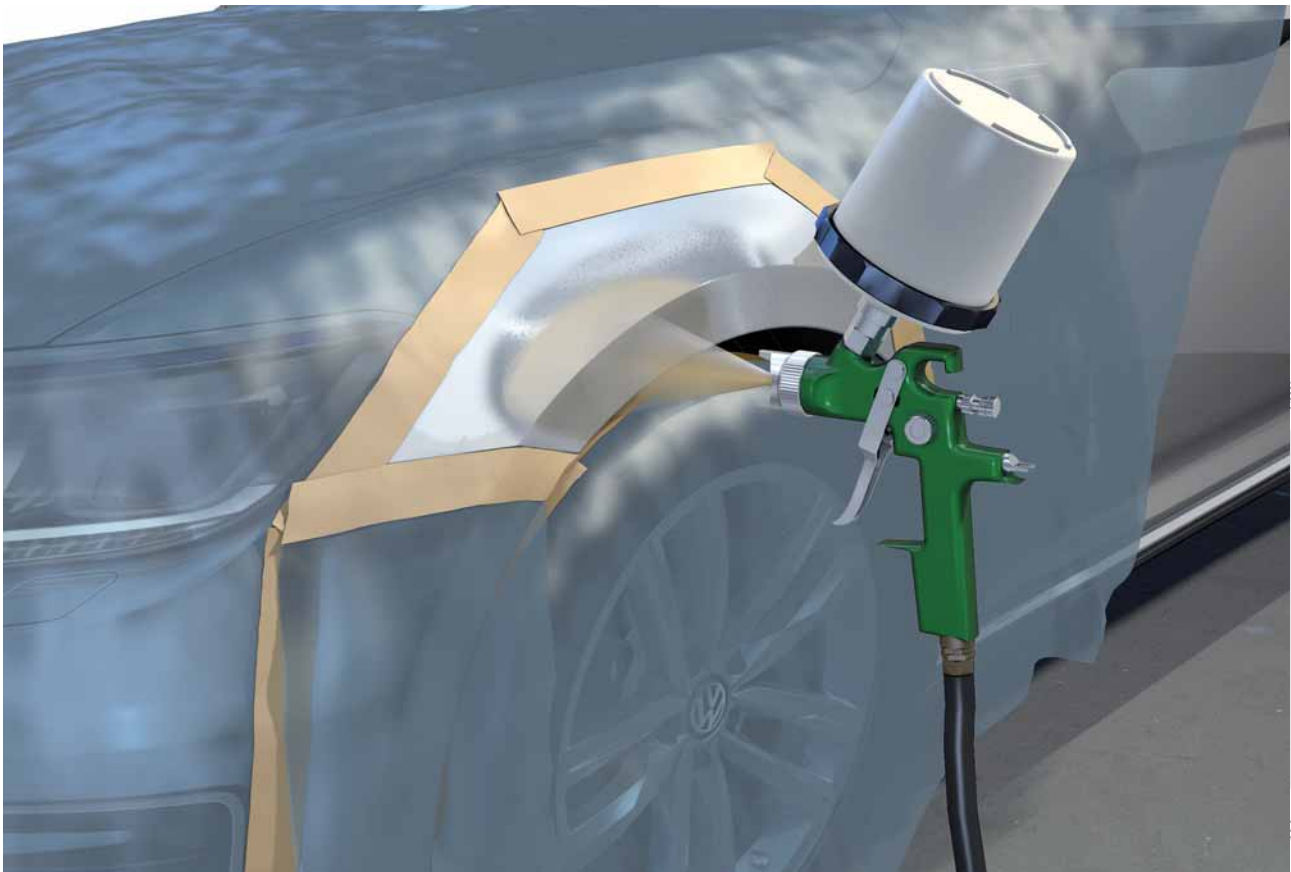
## Primer coat

The primer coat is an important component in the paintwork structure.

Being a one-pack or two-pack material, it forms the basis for a high-quality top coat finish. It is used on bare metal and areas that have been sanded through to bare metal.

In addition to being an outstanding anti-corrosion agent, it also has the task of providing a good key for subsequent paint layers.

If bare metal was exposed during the pre-treatment, two-pack wash primer will have to be used for the paintwork structure.



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# Preparations for painting

## Surfacers

Like the primer, the surfacer also makes a contribution to corrosion protection. It protects the body against stone chips and is used to prepare surfaces. Coloured surfacers improve the coating properties of paint colours that coat poorly. The following original materials are used at Volkswagen.

### 2K HS Performance Filler

The two-pack HS Performance Filler (high-solid) is a very high-quality, acrylic resin-based sanding surfacer with a high proportion of solid material.



S531\_063

### 2K HS Wet-on-Wet Surfacers

The two-pack HS Wet-on-Wet Surfacers is a high-quality, acrylic resin-based surfacer. It can be applied wet-on-wet. It is particularly suitable for AquaPremium top coats.



S531\_064

### 2K HS Mixing Filler system for coloured surfacers

The two-pack HS Mixing Filler is an innovative, coloured, acrylic resin-based surfacer system from the latest generation.

The system consists of six coloured surfacers (white, black, yellow, red, green and blue). They can be mixed with each other using simple formulas.



S531\_065

## Top coats

The following original materials are used at Volkswagen.

### AquaPremium

The AquaPremium system is a water-soluble base coat system with good coating properties. The mixing system contains all solid and effect colours for car paintwork repairs.



S531\_066

### AquaPlus

The AquaPlus system is a high-quality, water-soluble base coat system. It is based on special PU-dispersion technology (polyurethane) for high-quality solid and metallic two-coat paint finishes.



S531\_067

### Effect paints from the AquaPlus system

The AquaPlus system is a high-quality, water-soluble base coat system that is based on special PU dispersions. The base coat can be used for pearl effect/heliochrome two-coat paint finishes and for mother of pearl effect, three-coat paint finishes.



S531\_068

# Top coat

## Clear coats

The following original materials are used at Volkswagen.

### 2K HS Clear Varnish

This two-pack HS Clear Varnish is a VOC\*-compliant, high-quality clear coat.



S531\_069

### 2K MS Clear Varnish, matt

The matt two-pack MS Clear Varnish is a clear coat based on two-pack acrylic resin.



S531\_070

### 2K HS Optimum Clear Varnish/ 2K HS Optimum Plus Clear Varnish

The two-pack HS Optimum Clear Varnish is a VOC\*-compliant, high-quality clear coat. It is characterised by very fast drying and is fast and simple to polish.



S531\_071

## 2K HS Brilliant Clear Varnish/ 2K HS Brilliant Plus Clear Varnish

The two-pack HS Brilliant Clear Varnish and the two-pack HS Brilliant Plus Clear Varnish are high-gloss, VOC\*-compliant clear coats based on two-pack acrylic resin. Both are characterised by high filling properties and a high gloss.



S531\_072

## 2K HS Performance Clear Varnish

The two-pack HS Performance Clear Varnish is a high-gloss, VOC\*-compliant clear coat. It is characterised by fast drying.



S531\_073

\* The VOC value (Volatile Organic Compound) indicates the quantity (in grammes) of volatile, organic compounds per volume unit (litres) of paint.

# Painting in Service

## Spot repairs

Spot repair refers to a method of painting where small areas are painted. This technique allows small damaged spots to be repaired without disassembly work.



Spot repairs cannot be performed on all bodywork areas with good results. If the damage is in the area of large flat surfaces, there is a great risk that the repaired spot will still be visible later on. The reason for this is the even incidence of light that makes even slight differences in colour visible. If the repaired spot is in the area of a curvature, it will be harder to see due to the different incidence of light.

Good results are achieved with:

- Two-coat paint finishes
- Paint damage with scratches (without filling work) up to a diameter of 3.5 cm or a length of 3–5 cm.
- Application of clear coat up to an area of max. 200 mm x 300 mm.
- Smaller areas that are visually broken by other elements, e.g. trim strips, tail lights, swage lines and edges.
- Areas around edges on large components.

## Large surfaces



S531\_008

## Key

- Suitable for spot repair
- Partly suitable for spot repair

- Not suitable for spot repair

# Painting in Service

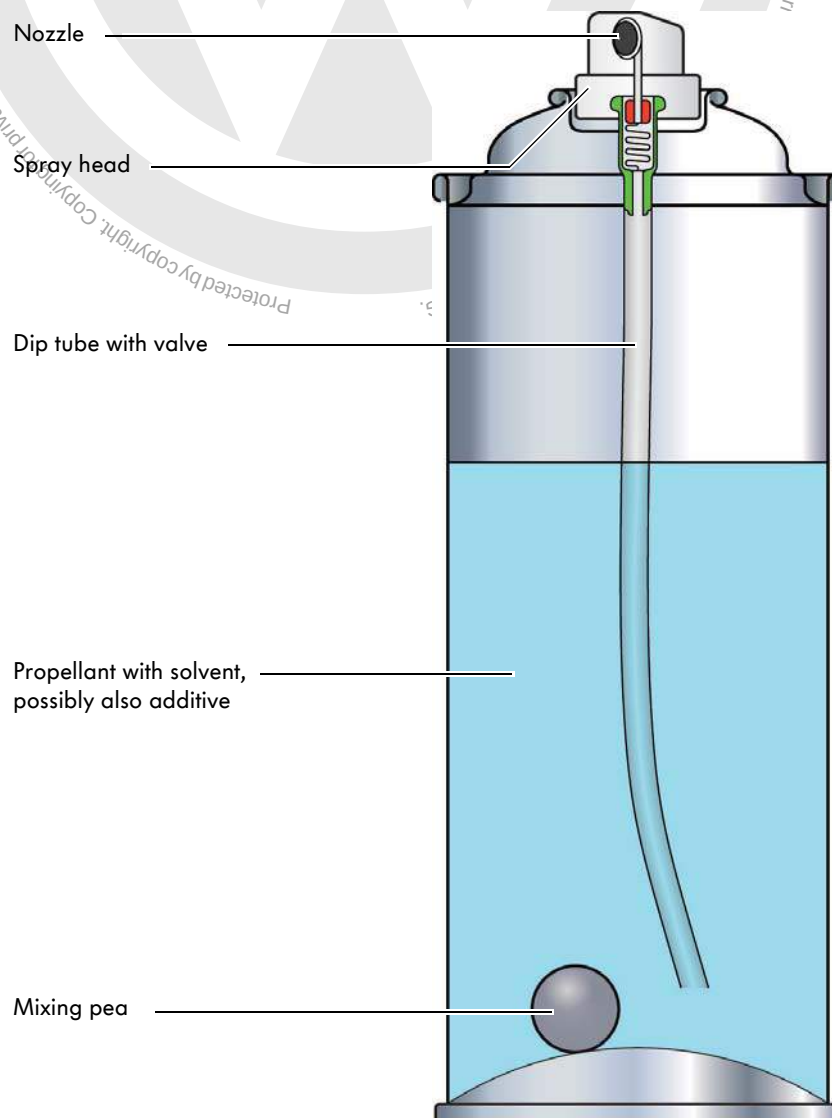
## Spray Max system

You can perform spot repairs with spray cans from the Spray Max system. The one-pack top coat and the two-pack clear coat are processed in the same way as when painting with paint spray guns.

### One-pack spray can

The one-pack original colours that have been mixed on a colour mixing rack are filled into cans with the spray can filling device VAS 6425, which does not require cleaning. An additive is also added depending on the paint material. The filled one-pack spray cans allow a professional paint finish in the original colour.

The illustration shows the spray can before filling with top coat.



S531\_060

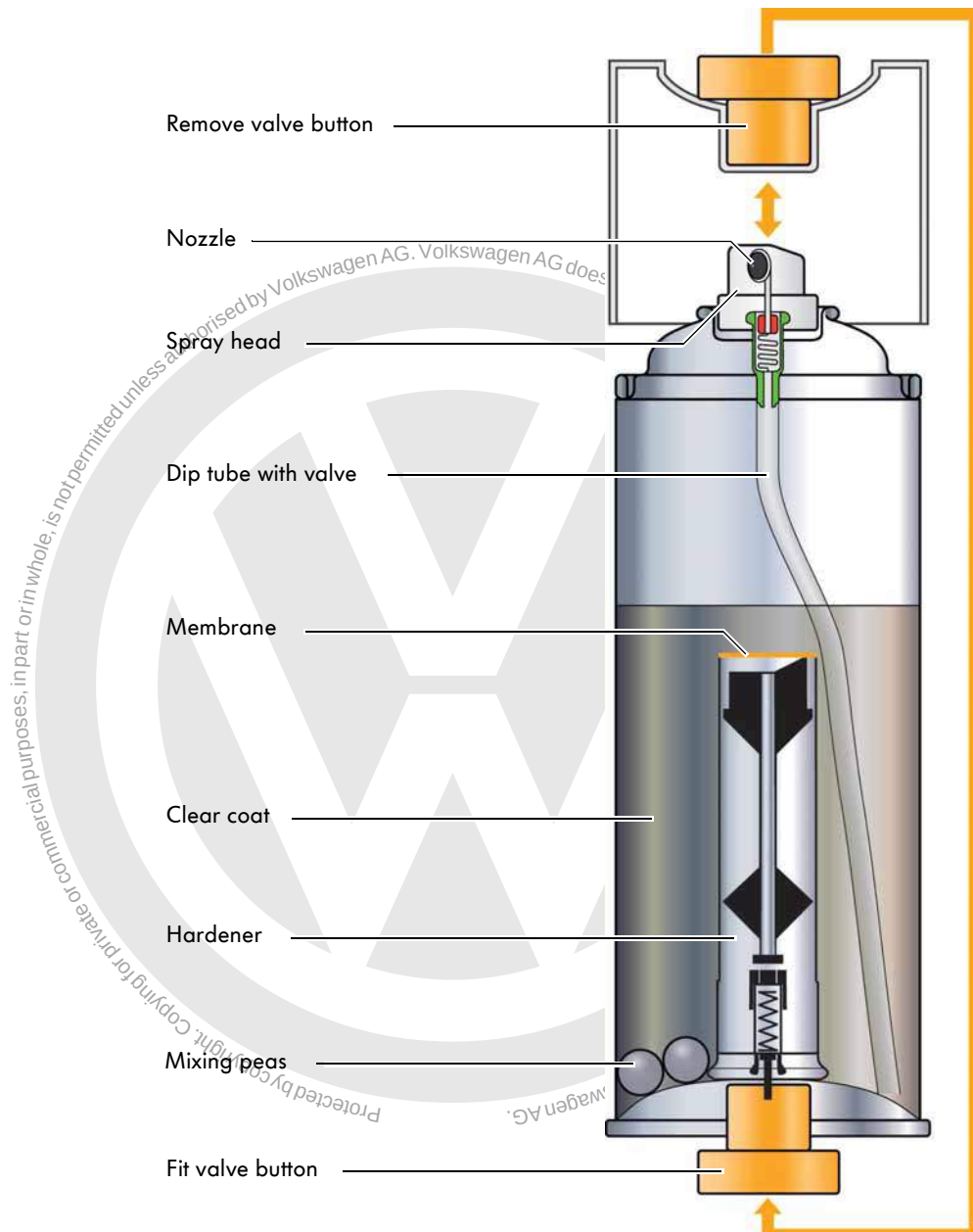
## Two-pack spray can for clear coat

The clear coat is a two-pack paint. It consists of:

- Hardener
- Clear coat

The two components are only mixed in the spray can when they are required.

To use, remove the valve button from the cap and fit it on the bottom of the spray can. Pressing the button will pierce the membrane inside the can. This mixes the hardener and clear coat.



S531\_061

# Painting in Service

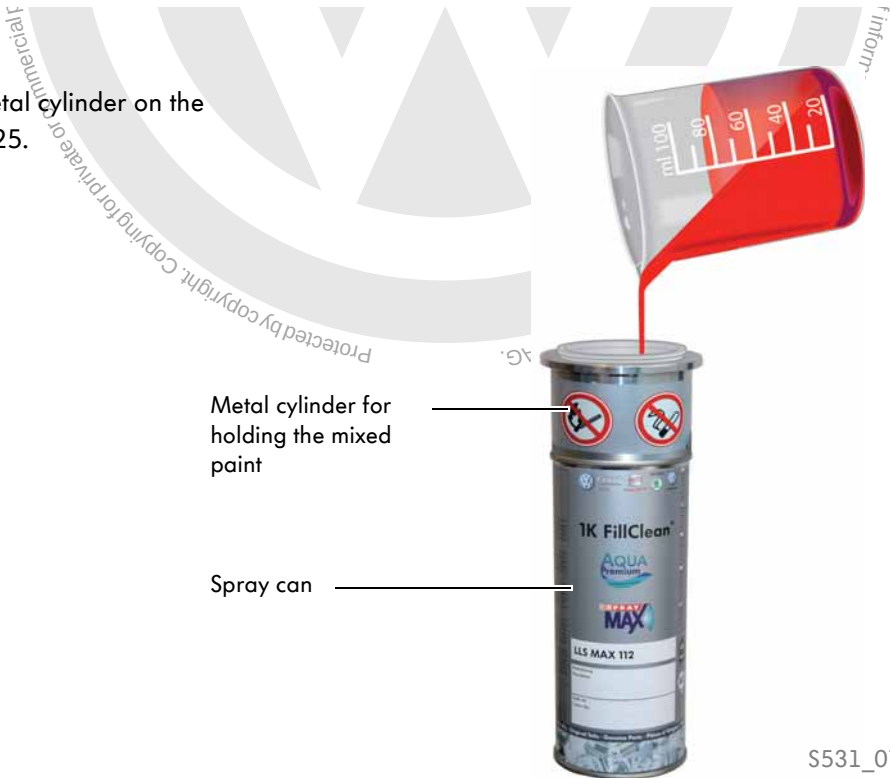
## Mini mixing system

The mini mixing system contains all ingredients required to mix the original colours.



S531\_075

Pour the mixed paint into the metal cylinder on the spray can filling device VAS 6425.



S531\_076

## Spray can filling device VAS 6425

The spray can filling device is used to fill the one-pack spray cans cleanly.

The filling device is made up of the following components:



ability with respect to the correctness of information in this

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S531\_077



Please refer to the device manual for the exact filling procedure with the spray can filling device VAS 6425.

# Painting in Service

## Work procedure for spot repairs

### Step 1: masking and cleaning

Protect neighbouring areas with masking paper and adhesive tape.



S531\_051

### Step 2: sanding

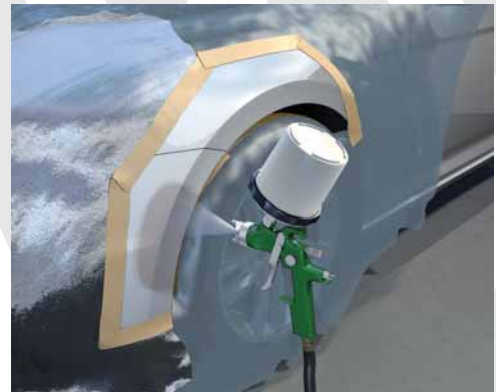
Sand the damaged area with suitable sanding tools (at first with P120/P180 grit, then with P240/P320 grit).



S531\_052

### Step 3: painting with surfacer

Cover plastic parts with aluminium foil to protect them from heat. Then paint the areas that have been sanded through to the bare material with a suitable primer surfacer.



S531\_053

### Step 4: drying the surfacer

Dry the surfacer with an infrared heater in accordance with the manufacturer's instructions.



S531\_054

### Step 5: sanding the surfacer

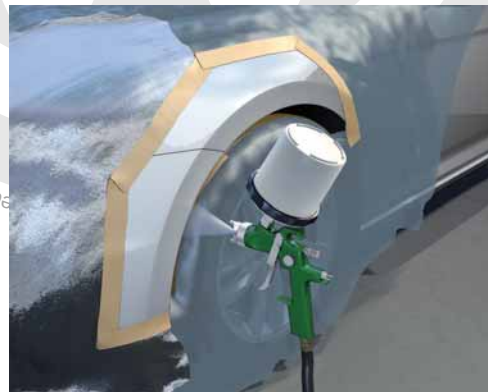
Sand the surfacer with suitable sanding tools using P400 grit. Sand the area surrounding the surfacer using P300 grit. Then clean the sanded area.



S531\_055

### Step 6: applying top coat

Spray the entire area that has been coated with surfacer with a base coat that has been prepared for spraying. Expand the area of each subsequent spray application. This overlapping results in only one misted zone. Make the run-off area larger and apply with lower pressure.



S531\_056

### Step 7: applying clear coat

Spray the entire painted area with a clear coat that has been prepared for spraying. Dry the clear coat with an infrared heater in accordance with the manufacturer's instructions. You can start polishing after one hour at the earliest.



S531\_057

### Step 8: polishing

Polish the transition areas with a polishing machine. Check the polished area for any holograms (in the case of dark colours). Holograms are very small scratches that break the light in different ways.



S531\_058

# Painting in Service

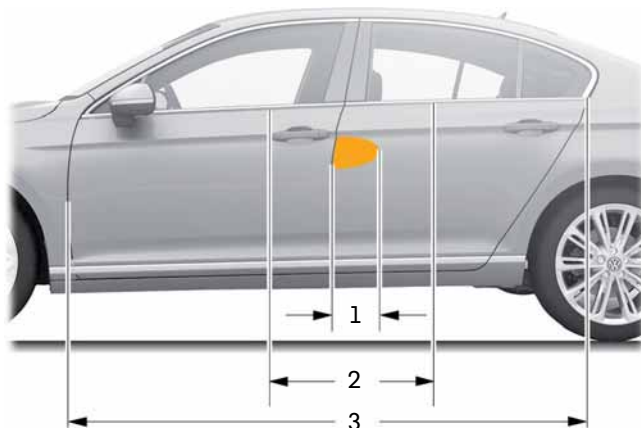
## Touch-up painting

Touch-up painting is necessary if there are colour or effect differences between the original and the repair paint or between an older and a new repair paint finish.

There are three techniques for touch-up painting.

### Painting neighbouring parts (colour matching)

This can involve one or more parts that border on the damaged surface.



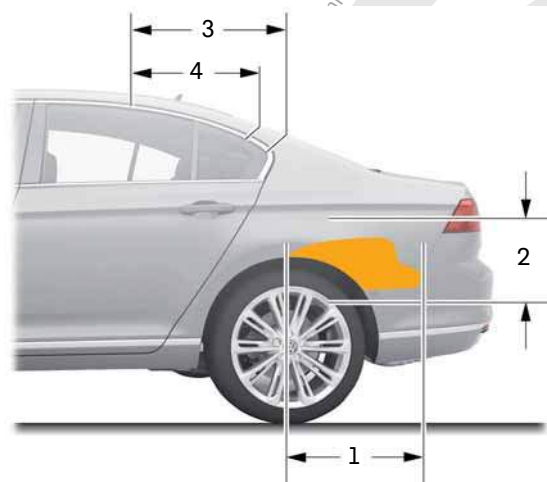
S531\_009

#### Key

- 1 Damaged, filled area
- 2 Base coat application
- 3 Clear coat application

### Touch-up painting to confine the repair surface

This method is used if the damaged surface does not have clearly defined edges on all sides.



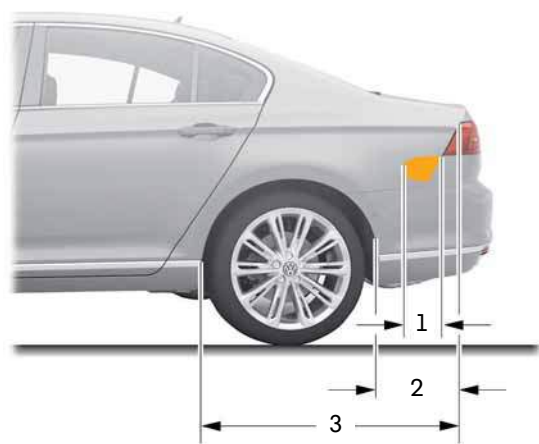
S531\_010

#### Key

- 1 Damaged, filled area
- 2 2–3 coats of base coat, painted with blended edges.
- 3 Transition area sanded with P1500–P2000 grit or with a copper sanding pad.
- 4 Transition area sprayed with highly thinned clear coat/fade-out thinner and reduced pressure.

## Touching up a part

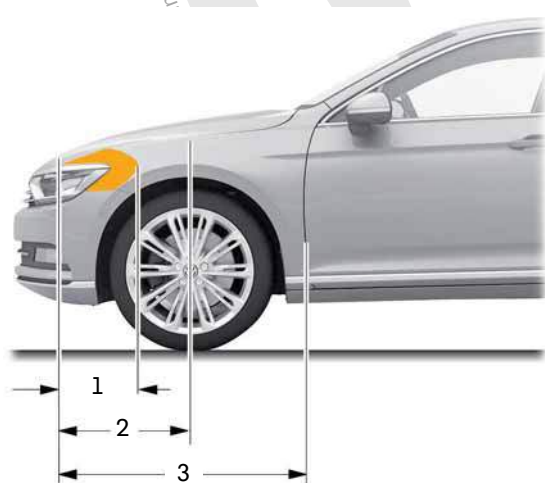
This is also known as spot repair. The painting is done only on the damaged part in this case. There must be enough of the remaining surface to carry out this work.



### Key

- 1 Damaged, filled area
- 2 Base coat application
- 3 Apply clear coat after applying the base coat

S531\_011



### Key

- 1 Damaged, filled area
- 2 Base coat application
- 3 Apply clear coat after applying the base coat

S531\_012

# Further information

## Labelling used during the painting process

The following pictograms are used in the paintwork manual and on the paint cans.

### Preparation

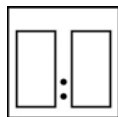


Clean

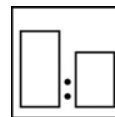


Sand lightly

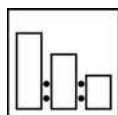
### Mixing



Mixing ratio 1:1,  
two-pack



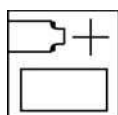
Mixing ratio,  
two-pack



Mixing ratio,  
three-pack



Use measuring stick

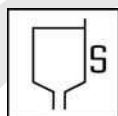


Add hardener



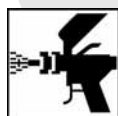
Add additives  
(measuring cap)

### Set viscosity

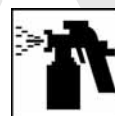


Processing viscosity

### Processing



Gravity-feed cup spray gun



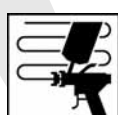
Suction-feed cup spray gun



Underseal spray gun



Spray can



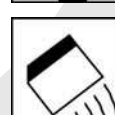
Painting applications  
(with gravity-feed cup spray gun)



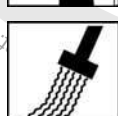
Painting applications  
(with suction-feed cup spray gun)



Painting applications  
(with spray can)



Apply filler

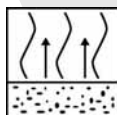


Brush on



Roll on

## Drying



Flash off



Drying time



Infrared drying time

## Further processing



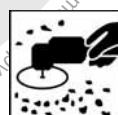
Sand by hand – wet



Sand by hand – dry



Rotary sander – wet  
(compressed air)



Rotary sander – dry



Oscillating sander – wet  
(compressed air)



Oscillating sander – dry



Polish

# Further information

## Safety information for working on electric, hybrid and gas vehicles

### Identifying electric and hybrid vehicles

Electric and hybrid vehicles can be identified from various labels. In contrast to vehicles with a combustion engine, specific safety measures must be observed.

Warning signs and prohibitive signs around and on the vehicle



Warning signs and prohibitive signs on components in the vehicle



Orange-coloured wires and components



You will find information on the warning notices in Self-study Programmes no. 525 "The Jetta Hybrid", no. 527 "The e-up!", no. 530 "The e-Golf" and no. 550 "The Passat GTE".

### Safety measures during painting

- At a drying temperature of +80°C, the maximum drying time of 30 minutes may not be exceeded.
- At a drying temperature of +60°C, the maximum drying time of 45 minutes may not be exceeded.
- When drying with infrared projectors, all high-voltage components need to be protected against direct infrared radiation.

## Identifying gas vehicles

Gas-powered vehicles can be distinguished from vehicles with conventional drives by means of the additional gas filler neck behind the tank flap or on the rear right-hand side of the vehicle. Specific safety measures should be observed for gas vehicles.



Gas filler neck

Cap

Petrol filler neck behind tank flap

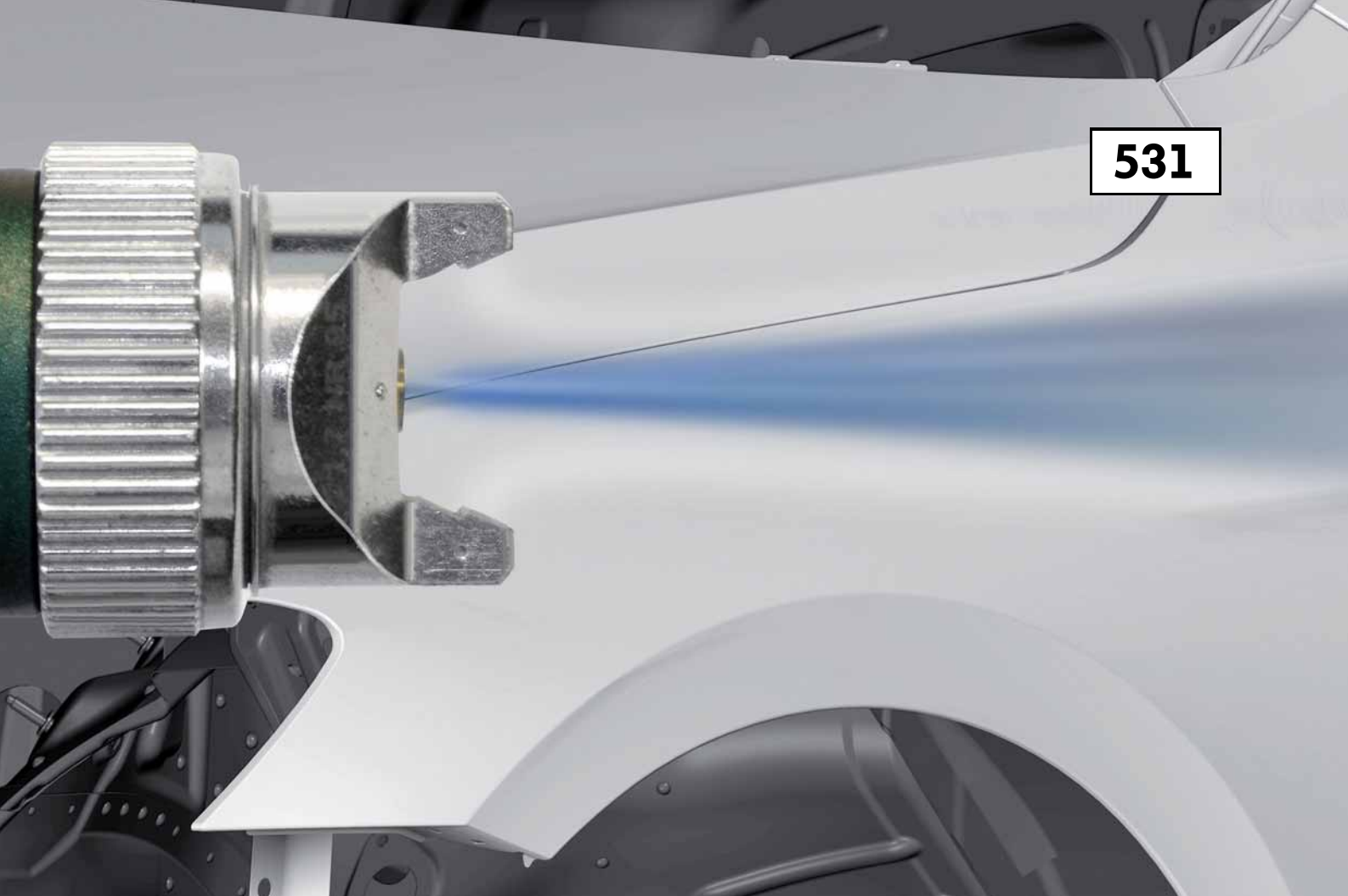
S531\_016

## Safety measures during painting

If the drying temperatures are too high, the safety valves on natural gas or liquid gas tanks could open. Natural gas or liquid gas could then leak.

The following guidelines must therefore be observed:

- Never expose components containing gas to temperatures above +60°C.
- When drying in a drying oven at temperatures above +60°C, the gas tanks need to be removed and the gas lines vented.
- Never expose components carrying gas in the high-pressure accumulator system to temperatures above +60°C when using infrared drying.



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