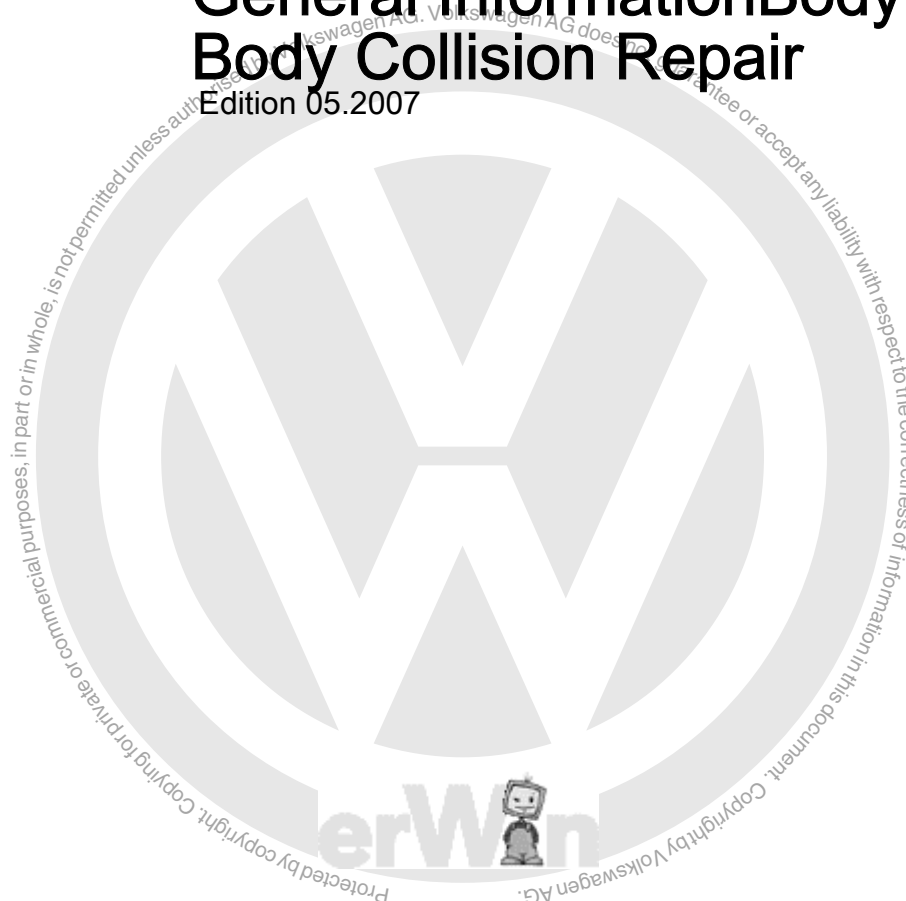




General Information Body Repair, Body Collision Repair

Edition 05.2007





Repair Group



Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.



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1 Safety Instructions



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

1.1 Removing Components

Before any disassembling work is done, the vehicle should be securely attached to the vehicle lift.

1.2 Battery, Welding Work



Note

Before disconnecting battery ensure that radio code is available. Ensure radio is in an operational condition by inputting radio code before releasing vehicle to customer.

Before welding work, always detach both battery connections and cover the terminals.

If work which produces sparks is to be performed in the vicinity of the battery, the vehicle battery must always be removed.



Caution

- ◆ **Switch ignition on before connecting battery!**
- ◆ **There must be nobody in the vehicle when connecting the battery!**

1.3 Electronic Control Units

Connect the ground (GND) connection of the electric welding appliance directly to the part to be welded. When doing this, make sure that no electrically insulated parts are between the ground (GND) connection and the welding point.

Do not allow the ground (GND) connection or the welding electrode to touch the electronic control units and electrical wiring.

1.3.1 Procedure for Electronic Control Units after Accident Repairs

It is only necessary to install new electronic control units after an accident where at least one of the following conditions is present:

- The housing is obviously deformed or damaged.
- The support surface or bracket is deformed; there is no visible external damage to the unit itself.
- The connector is damaged or corroded.
- The functional check or the unit self-diagnosis procedure indicates the fault "Control unit defective".

When electronic components, e.g. ABS control module, have been removed for the purpose of making repairs and are then reused, perform a functional check after installing as described in



the existing technical literature, e.g. V.A.G self-diagnosis procedure.

1.4 Paint, Glass, Upholstery, Trim

No other vehicles may be parked unprotected in areas used for body repairs. (Fire hazard due to flying sparks, battery, damage to paint and glass).

1.5 Fuel Tank or Fuel Lines

Use extreme care when performing sanding and welding work near the tank or other components carrying fuel. Where there are doubts regarding safety, these parts must be removed.

1.6 Air Conditioner

No parts of the charged air conditioner system may be welded, brazed or soldered. This also applies to any part of the vehicle if there is a risk that the parts of the air conditioner system could heat up. After paint repairs, the vehicle must not be heated up to more than 176° F (80° C) in the drying booth or preliminary heating zone, because heat causes a pressure increase which can burst the system.



Note

The circuit must be evacuated when it is necessary to weld electrically near the refrigerant hoses. During the electrical welding process invisible ultraviolet rays are given off which penetrate the refrigerant hoses and decompose the refrigerant.

1.6.1 Remedy

Evacuate air conditioning system: ⇒ Heating & Air Conditioning; Rep. Gr. 87 ; A/C Refrigerant System, Servicing

An empty system can only be recharged in a specially equipped V.A.G Service workshop. For this reason the system should only be opened and evacuated if this is required by the safety precautions.

If it is necessary to evacuate the refrigerant when carrying out repairs to a vehicle, avoid all contact with liquid refrigerant or refrigerant vapor!

Wear rubber gloves to protect the hands and goggles to protect the eyes! If the refrigerant comes into contact with unprotected parts of the body it will cause frostbite.



Caution

- ◆ *It is advisable to have a rinsing bottle for the eyes handy at all times. If liquid refrigerant gets into the eyes, they should be rinsed thoroughly with water for about 15 minutes.*
- ◆ *Then use eye drops and obtain medical attention immediately even if no pain is felt in the eyes. The doctor should be informed that the cause of the frostbite was R12 or R134a refrigerant.*
- ◆ *If the refrigerant comes into contact with other parts of the body despite compliance with safety measures, the part of the body concerned must be rinsed immediately with cold water for at least 15 minutes.*

Although refrigerant does not present a fire hazard, smoking is not permitted in rooms containing refrigerant vapors. The high



temperature of a burning cigarette causes a chemical breakdown of the refrigerant vapor. The products of this breakdown are poisonous and cause violent coughing and sickness when inhaled.

1.7 Airbag System

Repair information ⇒ Body Interior; Rep. Gr. 69 ; Airbag

When working on the airbag system and when performing straightening work during Body Repairs the battery ground (GND) strap must be disconnected.



Caution

- ◆ **Switch ignition on before connecting battery!**
- ◆ **There must be nobody in the vehicle when connecting the battery!**

Airbag components must not even briefly be subjected to temperatures above 100°C (212°F).

Airbag components must not come into contact with grease, cleaning agent, oil or similar.

Mechanically damaged airbag components must be replaced:

See disposal instructions ⇒ [page 34](#) .

Wash hands after touching airbag units which have been ignited!

1.8 Seat Belts, Checking



Caution

After every accident, seat belt system must be checked systematically. If damage is determined when checking the test points, customer must be informed regarding necessity of changing belts.

Test Points:

- ◆ Check belt strap
- ◆ Check inertia reel (locking effect)
- ◆ Visually check belt lock
- ◆ Functionally check belt lock
- ◆ Check belt guides and lock tongue
- ◆ Check securing parts and anchorage points
- ◆ Check lap belt retractor



Note

If customer refuses to have damaged belts replaced, appropriate note should be made.

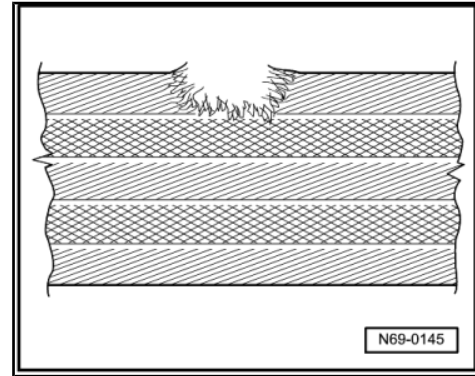
1.8.1 Belt Strap, Checking

- Pull belt completely out of inertia reel or lap belt adjustment tongue.

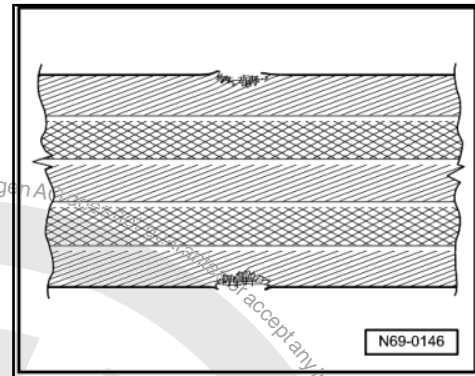


- Check belt for dirt and, if necessary, wash with mild soap solution → Instruction Manual.
- If either of following illustrated examples of damage (1 and 2) are determined on accident vehicle - replace seat belt and belt lock completely.
- If damage as illustrated under points 1, 2 or 3 is determined on a vehicle which has not been involved in an accident, it is sufficient to replace damaged belt only.

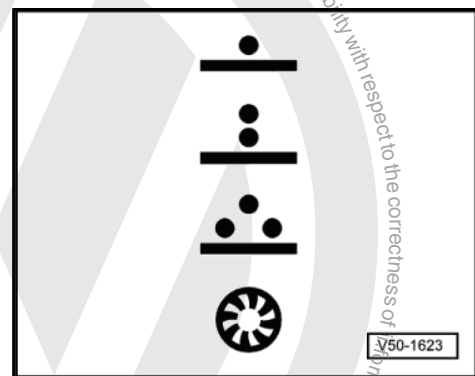
1 - Cut, torn or chafed belt



2 - Webbing loops on belt edge torn



3 - Burn marks from cigarettes or similar



1.8.2 Inertia Reel Locking Effect, Checking

Inertia reel has two locking functions.

- ♦ First locking function is initiated by belt being jerked out of reel (belt extraction acceleration).

Checking

- Pull belt out of inertia reel with sudden jerk.
- No locking effect - replace seat belt complete with lock.
- If difficulties are experienced when pulling belt out or reeling belt in, first check whether inertia reel is in the correct position.



- Second locking function is initiated by change in vehicle movement sequence (vehicle-dependent locking function).

Check

- Put seat belt on.
- Accelerate vehicle to 20 km/h and then carry out emergency braking with foot brake.
- If during braking procedure belt is not locked by locking mechanism, seat belt complete with belt lock must be replaced.



Caution

For safety reasons, road test should be carried out on traffic-free stretch to ensure that other motorists/pedestrians are not endangered.

1.8.3 Belt Lock, Visual Check

- Check belt lock for cracks and fracturing.
- If damage is determined, replace seat belt complete with belt lock.

1.8.4 Belt Lock, Functional Check

Checking locking mechanism:

- Push lock tongue into belt lock until it engages audibly. Check whether locking mechanism is properly engaged by giving belt firm pull.
- If belt tongue fails only once to engage properly in belt lock during minimum of 5 tests, seat belt must be replaced complete with belt lock.

Checking release mechanism:

- Release seat belt by depressing button on belt lock with finger pressure. When belt is slack, lock tongue must spring out of belt lock on its own.
- Carry out minimum of 5 tests. If belt tongue fails only once to spring out of lock, seat belt must be replaced complete with belt lock.



Caution

Under no circumstances whatsoever may lubricant be used to eliminate noise or stiffness at belt lock buttons.

1.8.5 Belt Guides and Lock Tongues, Checking

Plastic-covered guides show very fine parallel scoring, after strain on belt system (when belt has been worn during accident). (Wear which has been brought about by frequent belt use can be recognized by smooth signs of wear which are free of scoring).

- Examine for deformation, fracturing and cracks in plastic.
- If scoring and/or damage is determined, replace seat belt complete with belt lock.



1.8.6 Securing Parts and Anchorage Points, Checking

- ◆ Lock securing strap/bracket deformed (stretched)
- ◆ Height adjuster not functioning
- ◆ Anchorage point (seat, pillar or vehicle floor) signs of distortion or thread damage
- If damage is determined on such parts - replace seat belt complete with belt lock.
- Replace anchorage points.



Note

In case of damage which is not result of an accident (e.g. wear), only the part which is actually damaged need be replaced.

1.9 Safety Regulations for Belt Tensioners

- ◆ Testing, removing, installing and repair work may only be performed by qualified personnel.
- ◆ The pyrotechnic propellant has no expire date, i.e. it has unlimited, maintenance-free life.
- ◆ Belt tensioner components may be neither opened nor repaired; always use new parts.
- ◆ Belt tensioner units which have been dropped on the floor, must not be installed into a vehicle.
- ◆ Belt tensioner units which are mechanically damaged (dents, fractures) must be replaced.
- ◆ The belt tensioner unit should be installed immediately after removing them from their packaging.
- ◆ If the work is interrupted, the belt tensioner unit should again be placed in its packaging.
- ◆ It is not permitted to leave the belt tensioner unit unattended.
- ◆ The belt tensioner unit must not be treated with grease, cleaning or similar substances, nor may it be exposed to temperatures above 100°C (212°F), even for short periods.

1.10 Repairs on Vehicles with Belt Tensioners



Caution

- ◆ **Mechanically ignited belt tensioners without a carrier recognition (triggering lock) must be removed before starting cutting, straightening and/or bending operations.**
- ◆ **Disconnect the battery ground (GND) strap for electrically ignited belt tensioners.**

**Note**

If the seat belt is rolled on completely, the carrier recognition (triggering lock) will prevent the belt tensioner being ignited (triggered) in an accident.

**Caution**

- ◆ *The seat belt must not be unrolled (pulled out) on belt tensioners with a carrier recognition (triggering lock) when performing cutting, straightening and/or bending operations.*
- ◆ *If during cutting, straightening and/or bending operations there is a requirement to make large jolts, then seat belt tensioners with a carrier recognition (triggering lock) must be removed.*

The following vehicles do not have a belt tensioner with carrier recognition (triggering lock):

- Golf from MY 1992
- Golf Cabriolet from MY 1994
- Passat from MY 1988
- Passat from MY 1994

Removing and installing seat belts with belt tensioners ⇒ Body Interior; Rep. Gr. 69 ; Seat Belts

1.10.1 Belt Tensioner Applications

	Mechanical belt tensioner with carrier recognition	Electrical belt tensioner
Passat from MY 1997 front and rear	X	
Golf from MY 1998 front with side airbag		X
Golf from MY 1998 front without side airbag	X	
New Beetle from MY 1999 front with side airbag		X
New Beetle from MY 1999 front with side airbag only USA 1st model year	X	
New Beetle from MY 1999 front without side airbag	X	
EuroVan from MY 1991 front from MY 1998	X	



1.11 Cutting, Straightening and/or Bending Operations on Vehicles with Airbag

When working on the airbag system and when performing straightening work during Body Repairs the battery ground (GND) strap must be disconnected.



Caution

- ◆ *Switch ignition on before connecting battery!*
- ◆ *There must be nobody in the vehicle when connecting the battery!*

Repair information ⇒ Body Interior; Rep. Gr. 69 ; Airbag

1.12 Front Seats with Side Airbag



Caution

When removing the front seats it is absolutely necessary to observe safety precautions.

The safety precautions are found in ⇒ Body Interior; Rep. Gr. 69 ; Airbag



2 Basic Instructions



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

2.1 Diagnosis on Accident Vehicles

Damage to the running gear and assembly mountings, which could have very serious effects later on is sometimes not discovered when accident vehicles are being repaired. Where the accident damage indicates over-stressing of the vehicle, special attention must be paid to the following components, completely independent of the axle geometry check which must be done in all cases:

- ◆ Check to ensure that the steering gear and linkage operate correctly over the complete lock-to lock range. Carry out a visual check for bent or cracked parts.
- ◆ Check the running gear and all running gear components such as wishbones/trailing arms, suspension struts, steering knuckles, anti-roll bars, sub-frames, axle beams and mountings for bending, twisting and fracturing.
- ◆ Examine wheels and tires for damage, true running and imbalance. Examine tires for cuts/slits etc. in treads and walls and check the pressures.
- ◆ Examine the engine/gearbox/exhaust system mountings for damage.
- ◆ Finally, a thorough road test after repairs will give the assurance that the vehicle is once again completely roadworthy and can be handed back to the customer without any doubts as to its mechanical state.

2.2 Conditions in Which Body and/or Parts are Passed for Painting

Before a repaired vehicle or part is handed over to the paint shop for painting, the repaired or beaten out, and where necessary, filled surfaces must be prepared for painting by rubbing-down with abrasive paper having a grade of P 80 - P 100.

This preparatory work is the job of the sheet metal worker and is included in the time allowed for the repair.

2.3 Straightening

Bodies and floor sections are produced mainly from cold formed deep drawn sheet metal. For this reason the reshaping of accident damaged areas should be carried out in the same manner.

If the extent of the damage does not permit reforming, the damaged part should be cut out after adjacent surfaces have been straightened.

2.4 Parting Cuts

In areas where cutting and the subsequent joining affect the rigidity of the body and also the operational safety and serviceability of the vehicle, the parting cuts must be made in accordance with the Repair Manual instructions.



2.5 Replacement Body Sub-Parts and Part Sections

A "sub-part" is a section of a complete part (e.g. end section front and rear), which is supplied direct from the Parts Department, already cut to size.

- On other hand "part sections" are cut from complete parts to the required size, by the workshop doing the repair. In individual cases it will be necessary to work exactly to the method described and illustrated in the manual.
- Because the use of "sub-parts" and/or "part sections" together with special tools and equipment influence the repair times, special note is made of the tools and equipment in the description of repair.

2.6 Original Joint

The term "Original joint" means the welded joint, which was made at the time the vehicle was manufactured.

These welded joints must be restored when carrying out body repairs.

When doing this ensure that the standard number of spot welds is not reduced when carrying out repairs.

Repair methods and procedures which deviate from the original joint are described in the appropriate Body Repairs Repair Manual.

2.7 Galvanized Body Parts

Fully galvanized panels provide a high level of bodywork anti-corrosion protection during manufacture. To be able to maintain the warranty guarantee against perforation rusting when carrying out repairs, the repair information from page [⇒ page 40](#) must be complied with.



Caution

As toxic zinc oxide is produced when welding galvanized body panels, good workplace ventilation and smoke extraction via suitable extraction system, e.g. -V.A.G 1586-, must be provided.

2.8 Removing Material Remains

If the damaged body part has been roughly removed in accordance with the separating cuts in the respective Repair Manual, e.g. using pneumatic hammer -V.A.G 1577- or body saw -V.A.G 1523-, most spot weld joints can be drilled out with the spot weld opener -V.A.G 1731-.

Beyond this, we recommend the use of the parallel grinder -V.A.G 1529- and an angle grinder to remove the weld joints which are not removed by the spot weld opener alone.

2.9 New Parts

New parts which are not accessible from the inside after a repair, e.g. side members, should, to prevent corrosion, be pre-painted in the color of the vehicle before being welded in. Here it is recommended to mask the welding flanges.



2.10 Service Parts

In order to reduce the number of different parts, many service parts are only supplied as a "basic version".

Examples:

- Fenders for Golf from MY 1984 up to MY 1991 without holes for trim strips and aerial.
- Tailgate for EuroVan from MY 1991 without holes for rear wiper or interior trim.

It is recommended that the workshop make its own "templates" from damaged parts for such cases.

Example tailgate for EuroVan from MY 1991 hole for rear wiper:

- Using body saw -V.A.G 1523- , cut out a section of the tailgate. In doing this note distinct contours, e.g. a section with the depression for the VW emblem and the edge above the wiper hole. Remove burr from cut edge and mask with reinforced adhesive tape.

The strength of the template material must be considered when applying the template and spot drilling prior to painting the new parts.

Check new spare parts e.g. doors, hood/trunk lid or wings for transportation damage before passing to paint spraying shop. This prevents respraying when transportation or other damage is noted first when installing.





3 Symbols



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

3.1 Symbols for Welding Operations

RP Spot welded seam (single row) RP = spot welding

RP Spot welded seam (double row)

RP Spot welded seam (double row offset)

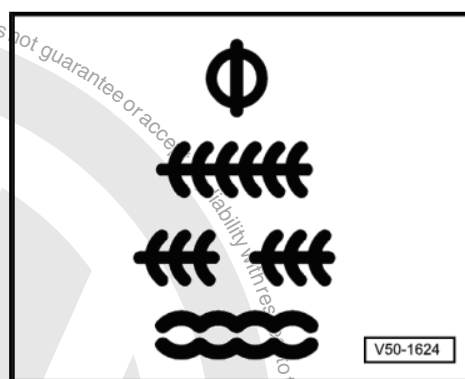
SG Plug weld seam SG = Shielded arc welding

SG Stepped seam

SG Continuous seam

SG Continuous seam (staggered)

Brazing



3.2 Symbols for Working Procedures

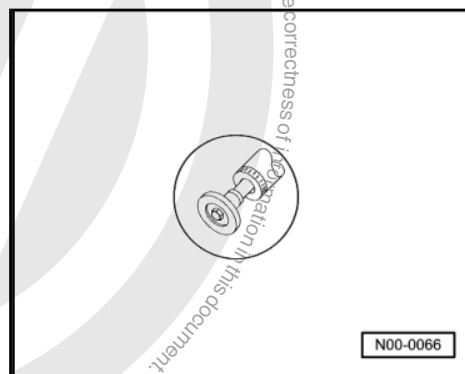
Grind

- In order to strip off material from a welding seam using a rod grinder.



Note

- ♦ *Welding seams should be ground so that the strength of the outer panels is reduced by a minimum or not at all.*



**Offset**

- For overlap welding.

Punch

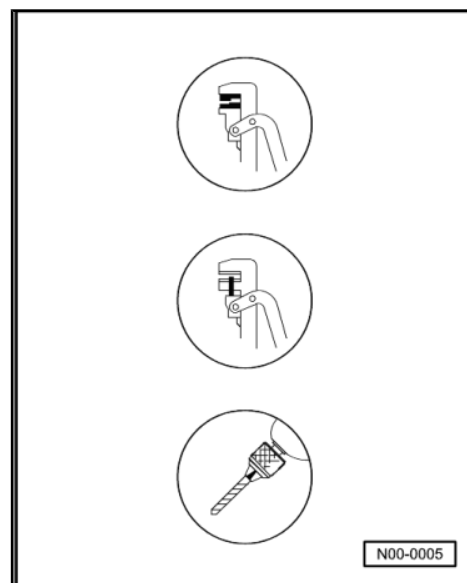
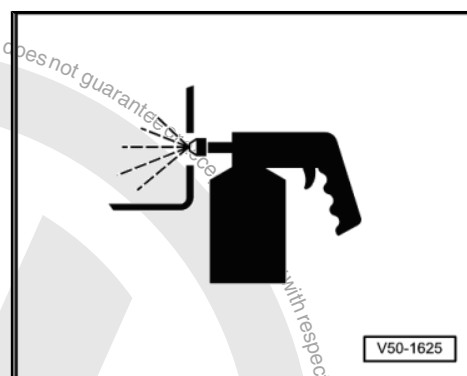
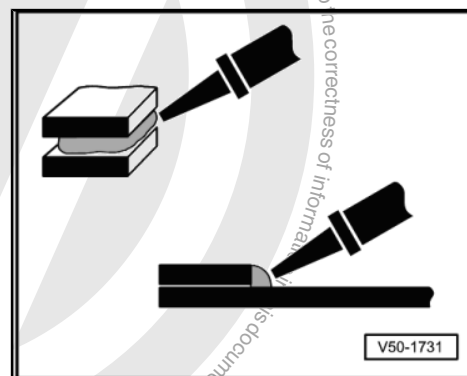
- For subsequent SG plug welding.

Drill

- For subsequent SG plug welding or spot welding (original joint).

Grind

- ◆ Use brush -VAS 5182- to remove paint in areas where access is difficult (e.g. inner roof frame).

**Cavity conservation****Bond
Seal**



4 Body Repair Tools



Note

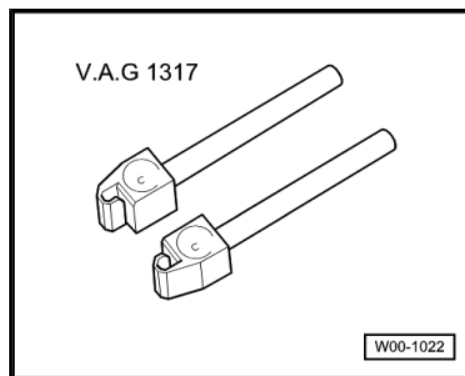
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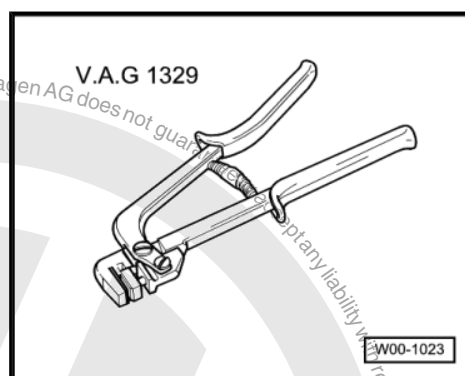
Note

The tools listed below are listed according to V.A.G / VAS numbers.

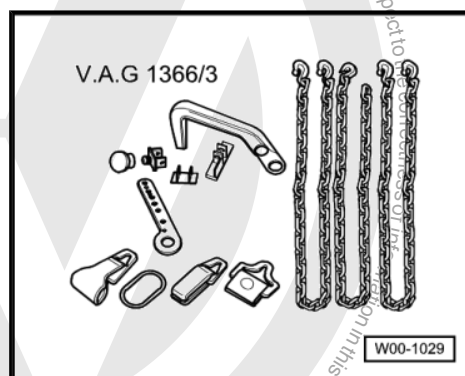
-V.A.G 1317- Fold opener



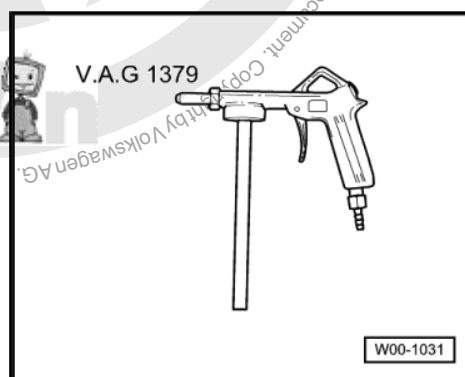
-V.A.G 1329- Hole punch



-V.A.G 1366/3- Basic equipment

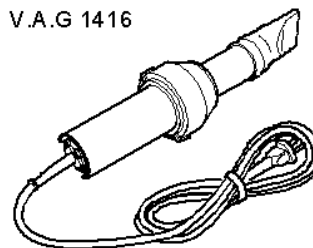


-V.A.G 1379- Underbody protection gun



**-V.A.G 1416- Hot air blower**

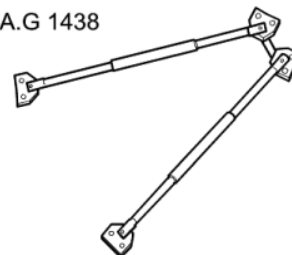
V.A.G 1416



W00-0004

-V.A.G 1438- Door brace

V.A.G 1438



W00-1030

-V.A.G 1439- Body equipment trolley

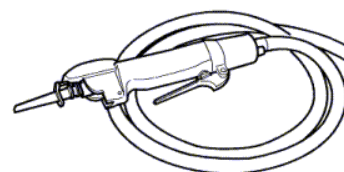
V.A.G 1439



W00-1026

-V.A.G 1523A- Body repair saw

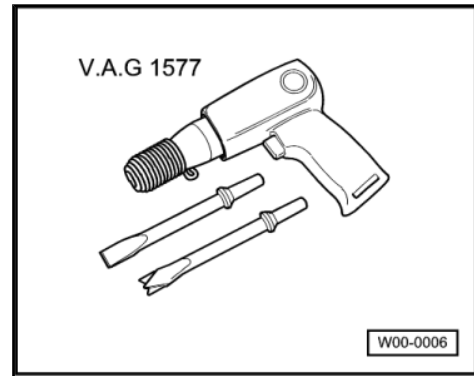
V.A.G 1523 A



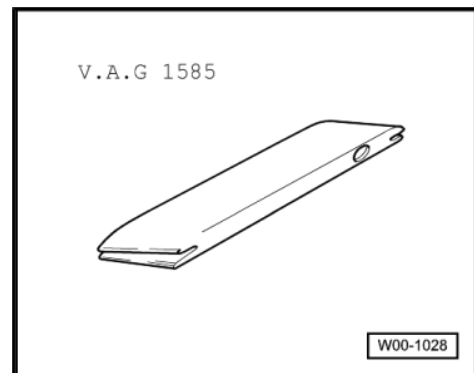
W00-0005



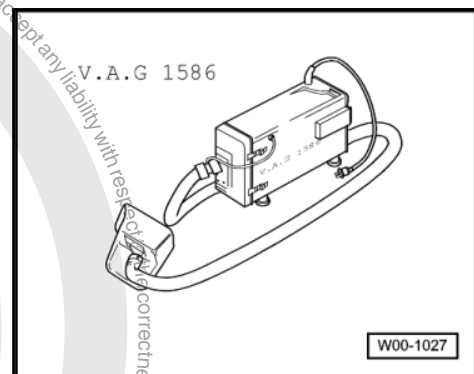
-V.A.G 1577- Pneumatic hammer



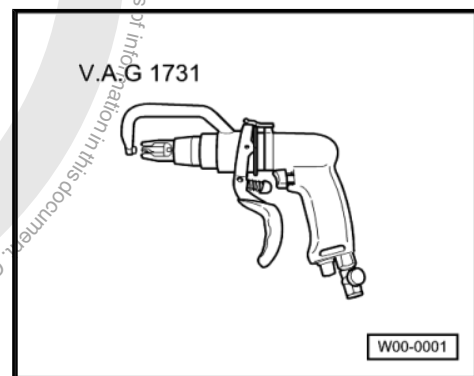
-V.A.G 1585- Flanging tool



-V.A.G 1586- Welding smoke extractor



-V.A.G 1731- Welding spot breaker





-V.A.G 1761/1- Compressed air gun

Compressed air gun to produce sealing and underbody protection to original factory condition.

In addition all 310 ml cartridges can be used with this gun.

V.A.G 1761/1



W00-1032

-VAS 1996- Compressed air hole punch and offsetting clamp

VAS 1996

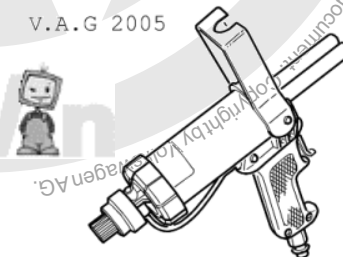


W00-0002

-V.A.G 2005- Compressed air adhesive pistol

- ◆ For body adhesive

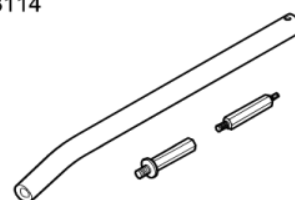
V.A.G 2005



W00-1000

Straightening tool for door hinges

3114



W00-0082



Hose packet 5023

- ◆ Nozzle set 5023/1

VAS 5023



W00-0003

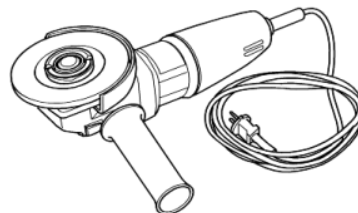
-VAS 5174- Angle grinder

- ◆ 710 Watt; 115 mm Ø

-VAS 5175- Angle grinder

- ◆ 1500 Watt; 180 mm Ø

VAS 5174

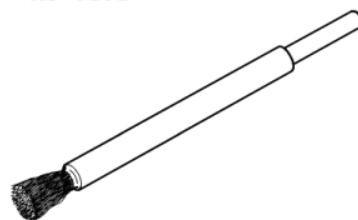


W00-1024

-VAS 5182- Brush

- ◆ Use to remove paint in areas where access is difficult (e.g. inner roof frame)

VAS 5182



W00-0999



5 Materials for Body Repairs and General Body Repairs



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

5.1 Adhesives

Adhesives	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Universal adhesive	D 001 200	For sticking insulating materials, rubber parts, carpets, upholstery padding, textiles.	
Adhesive for synthetic materials	AMV 195 KD1 01	For sticking rubber, PUR and EPDM to each other.	Instant adhesive
2 component adhesive	D 001 500	For bonding jacking points and wing to inner wheel housing joint.	
2 component adhesive	D 180 KD1 A3	For bonding inner and outer side panels: EuroVan from MY 1991 For bonding roof.	
2 component adhesive	DA 001 730 A1	For bonding: e.g. side panels to wheel housing The adhesive is listed in the relevant repair description	Pot life: 30 minutes

Adhesives	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Moulded rubber adhesive	D 002 100	For bonding door, hood and other rubber seals to painted metal.	
1 Glass and metal adhesive kit	D 000 703 A1	For bonding rear-view mirror bases and vent window attachments.	Not for windows with rain sensor
2 component adhesive kit (PUR)	D 004 300 05	For bonding flush bonded windshield and side windows.	Quick hardening
1 component window adhesive	DH 009 100	For bonding flush bonded windshields, side and rear windows.	300 ml



Adhesives	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
1 component window adhesive	DH 009 100 03	For bonding flush bonded windshields, side and rear windows. (Additionally when contents of cartridge D 004 300 05 and DH 009 100 is insufficient or for resealing).	Small cartridge 110 ml
Assembly adhesive	D 190 MKD A3	For bonding high roof of EuroVan from MY 1991, only Westfalia production, roof reinforcement (insulation) and bulkheads.	

Adhesives	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Activator	AMV 181 800 02	For activating pre-coated windows.	
Applicator	D 009 500 25	For applying primers and activators.	Order unit 25
Glass and paint primer	D 009 200 02	Primer for bonding windows. Must be applied to window. Adhesion-promoting primer for painted surfaces before applying adhesive sealant (PUR).	
Primer for plastic materials	D 009 600	For all plastics which are to be bonded with PUR based adhesive sealant.	
Cleaning solution	D 009 401 04	For cleaning all surfaces which come into contact with primer or adhesive.	
2 component adhesive material	D 173 KD2 A1	For bonding immobilizer reader unit (Autoguard)	Quick hardening

Adhesives	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Adhesive	AKL 407 000 05	Dispersion adhesive for bonding moulded headlining Passat 1988 to 1993, or thick moulded parts to inside body surfaces.	
2 component adhesive/hardener for imitation leather	D 000 801 D 000 802	For bonding laminated plastics - including convertible top covers - and PVC materials. Mixing ratio: 10 parts by weight - Adhesive D 000 801 1 part by weight - Hardener D 000 802	Heat resistant to 120°



Adhesives	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Double sided adhesive tape	AKL 434 019 25 (19 mm) optionally AKL 440 025 (25 mm)	For sticking protective foil (PVC and Polyethylene) to door inner panels.	
Protective foil	AKL 448 030 05	To prevent chafing between body and installed parts.	
Double sided adhesive tape	D 004 400	Bonding spoilers.	
Double sided adhesive tape	D 438 525 A2	For securing trim strips, emblems and decorative items. Used as an assembly aid and for fixing.	Approx. 1 mm thick
Polyurethane adhesive sealing compound	AKD 476 KD5 05	For bonding spare wheel well. For sealing high roof and rain channels EuroVan through MY 1990, Westfalia production only. For coating all joints which are subjected to strong torsional forces. Bonds and/or seals metal, plastic and glass together or to each other. For coating large-area joints at parts subjected to torsional stress. Fine sealing after body repairs.	Can be painted!
2-component polyurethane adhesive	D 180 KD2 A1	For bonding repair plates: Tailgates Bonding reinforcement for rear loudspeakers For bonding interior rear-view mirror retainer plate	
Mixer nozzle	D 001 001	For 2 component adhesive D 180 KD2 A1	
Operating gun	- VAS 515 5-	For 2 component adhesive D 180 KD2 A1	



5.2 Sealants

Sealants	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Silicone adhesive sealing compound (black)	D 176 001 A3	For sealing high-roof and rain channels on Euro-Van, Hanover production. For coating all joints which are subjected to strong torsional forces. Bonds and/or seals metal, plastic and glass together or to each other. Gaps in door and hood/tailgate seals, water deflector plates, convertible, roof rails.	Cannot be painted!
Silicone adhesive sealing compound (white)	D 176 101 A3	For sealing high-roof and rain channels on Euro-Van, Hanover production. For coating all joints which are subjected to strong torsional forces. Bonds and/or seals metal, plastic and glass together or to each other. Adhesive sealing of water deflector profiles/trims, grommets and rubber seals.	Cannot be painted!
Sealing cord 10 mm Ø	AKD497 01004 R10	For sealing all bolted on body parts or tail light clusters.	

Sealants	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Butyl adhesive sealing cord 5 mm Ø	AKL 450 005 05	For bonding and sealing plastic parts to each other and to painted metal surfaces, tail light clusters and openings in body-work.	
Black adhesive sealing compound	D 469 101 A3	For sealing all leaking windows as well as sealing and bonding door insulation sheeting (not for transparent sheet)	Can be dabbed off
Plastic sealing tape	D 001 900 05	For sealing bolts, holes for wiring, pipes and for bolted on body parts.	

Sealants	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Sealing compound	AKD 511 003 05	For coating all visible folds, joints and edges.	
Sealing compound light	AKD 512 000 05	For sealing hidden welded seams, gaps and joints.	



Sealants	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Sealing compound, grey, can be sprayed	D 476 KD7 A3	Restoration of fine sealing, structured sealing and restoring underbody protection to factory standard structure.	
Sealing compound, black, can be sprayed	D 476 KD9 A3	Restoration of fine sealing, structured sealing and restoring underbody protection to factory standard structure.	
2K Filler foam	D 000 111 A2	For filling with foam: EuroVan from MY 1991 A pillar and sill Golf from MY 1994 rear cross panel area	

5.3 Locking Fluids

Locking fluids	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Locking fluid	D 000 600 A2	For locking threaded fasteners from M8: e.g. for securing seat belt anchorage bolts:	
Locking fluid	D 185 400 A2	For locking threaded fasteners up to max. M 6: e.g. window cranks, sliding/tilting roof, etc., easily dismantled.	

5.4 Surface Protection Materials

Surface protection materials	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Zinc packing	AKL 381 035 50	Packing for wings or tailgate and hood hinges for protection against corrosion during repairs.	In Qty. 50 bags
Cavity sealant brown	D 330 KD1 A2	For use in cavities after each repair.	
Cavity sealant brown	D 330 KD2 A3		Spray can
Preservation wax	AKR 321 M16 10	For preserving all outer or internal body parts.	
Preservation wax	AKR 321 M15 4		Spray can
Long term underbody protection	D 003 500	Structured sealing in engine compartment, front and rear cross panels and underside of vehicle.	



Surface protection materials	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Stone impact protection black	AKR 311 KD1 05	Restoring the underbody protection.	Spray can
Stone impact protection black	AKR 311 KD1 10		
Wax Bitumen underbody protection	D 316 D38 10		

5.5 Anti-Corrosion Materials

Anti-corrosion materials	Part No.	Use/Range of application	Designation / Manufacturer Remarks
Zinc spray	D 007 500 04	As corrosion control for sheet metal parts where it is not possible to paint them and for use as spot welding paint.	Spray can
1 Component corrosion control primer	ALN 002 003 04	Apply to bare sheet metal.	Spray can
1 Component corrosion control primer	ALN 002 003 10	Apply to bare sheet metal.	
2 Component corrosion control primer	ALK 007 003 10	Apply to bare sheet metal and Aluminium.	
2 Component Acrylic primer filler	ALN 766 001 13	Protective coat before top coat.	


5.6 Chemical Materials

Chemical materials	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Aerosol spray	L 016 504	Temporary paint softener when carrying out straightening operations on body, on bolted on parts and hinge areas.	Spray can
Lubricant	G 052 745 A3	For lubricating lock cylinders, rotary latches, door, hood and tailgate hinges - water-repellant.	



Chemical materials	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
Lock cylinder grease spray	G 000 400 01	For lubricating installed lock cylinders accessible from outside, as preventative care measure.	
Adhesive remover	D 002 000 10	For removing fresh adhesive from convertible top cover, headlining, trim panels and upholstery. Also suitable for painted surfaces but only for very short periods.	
Special lubricant	G 000 450 02	Sliding/tilting roof: Passat 1988 to 1993, Passat from MY 1994 Golf from MY 1992	
Paint remover	LLE 812 000 A2	For removing primer on galvanized replacement parts before welding in.	
Solid lubricant paste	G 000 150	Door check straps.	
Silicone lubricant spray	D 007 000 A2	Serves as lubricant, e.g. for sliding roofs, seat rails, window lifters, head restraint rods, and as an aid when installing hoses. Protects seals on doors, hood and tailgate against freezing. Also highly suitable as an anti-squeak agent for all plastic parts.	

5.7 Filling Materials

Filling materials	Part No.	Use/Range of applications	Designation / Manufacturer Remarks
1 Component Acrylic fine filler	ALN 784 001 10	For repairing small uneven areas when touching-up paintwork.	0.5 Kg 
2 Component Vario filler	ALN 787 200 10	For filling larger uneven areas (only use with hardener). Rub-down before painting:	1 Kg
2 Component Vario filler	ALN 787 200 20	with machine - grade P80 by hand - grade P120 - 150	2 Kg
Hardener	ALZ 018 000 03	For 2 component filler.	30 g



6 Bodywork - Bonded Joints



Note

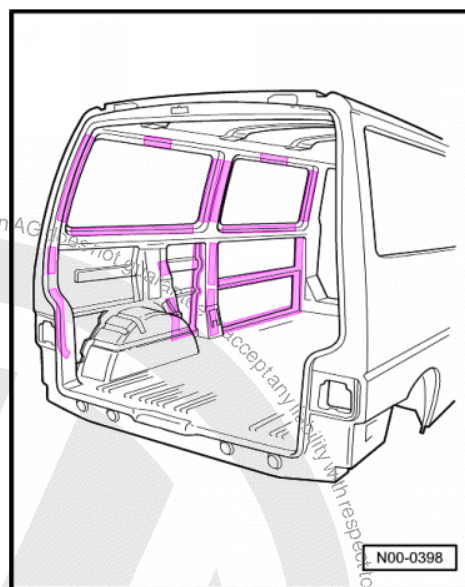
The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

6.1 EuroVan from MY 1991

The following procedures are employed for repairs at the bonded joints:

6.1.1 Separation

- Separate the adhesive bead with the oscillating cutting knife.
- Remove remaining adhesive with knife and scraper.



6.1.2 Bonding Procedure

- ♦ Material: D 180 KD1 A3
- Measures for preparing surfaces to be bonded and process-specific information are to be taken from the repair adhesive instructions for use.

6.2 Types of Bonded Joints

To increase the body stiffness and strength, bonded and spot welded bonded joints are ever increasingly being employed in the factory. They differentiate as follows:

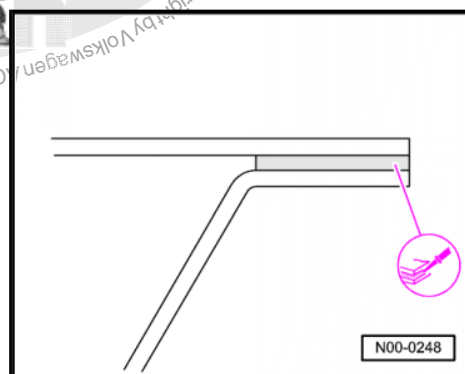
6.2.1 Strength Bonded Joints

With these bonded joints the panels are joined only by adhesive.

The distance of adhesive surfaces to one another should not be less than 2 or more than 4 mm. Rework adhesive surfaces if necessary.

Repair measure

- The bonded joints are reinstalled using the materials as given in the Repair Manual or spare parts program.



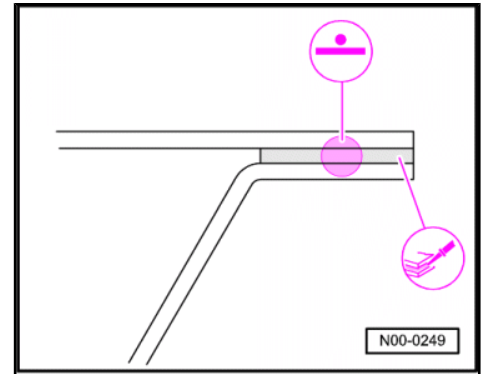


6.2.2 Spot Welded Bonded Joints

For spot welded bonded joints an electrically conductive adhesive is used between the panels, which allows problem free welding.

The distance of spot weld surfaces to one another should not be more than 1 mm. Rework adhesive surfaces if necessary.

The welding current must not be increased for spot welded/bonded joints. The pre-press period must be increased to approximately 30 - 50 periods. The gases produced must be extracted.



6.3 Repair Remedies for Partial Repairs

Adhesive DA 001 730 A1 in conjunction with compressed air driven adhesive pistol -V.A.G 2005- is used as a substitute for the sort weld adhesive.

Instructions for use ⇒ [page 28](#) .

For simultaneous bonding and welding the procedures are dictated by the type of weld (spot welding, shielded arc welding) as follows:

6.3.1 RP Spot Welding and Bonding

When spot welding and bonding in repair cases, all spot welds and adhesives are replaced as for a production vehicle.

For welding problems, i.e. a three-layer panel joint, if only the outer panel is replaced the weld points are set over the "old" weld points.

6.3.2 SG Welding and Bonding (Spot Welding Not Possible)

If it is not possible to reach a bonded joint with a spot weld unit then SG plug welds are used.

In this case, to ensure a good root weld the adhesive is not used. Spacing of SG plug welds is set at 15 mm.

6.3.3 Extraction of Weld Fumes

When spot welding in conjunction with spot weld adhesive, the normal extraction system for welding galvanized panels is used.

6.3.4 Preparation

The body panels which are to be welded must be adapted to fit prior to applying the adhesive.

The adhesive surfaces in the area of the weld must be free of primer and remains of adhesive as well as dust and grease.

The otherwise normal action of applying zinc spray is not performed in area of adhesive.

When spot welding the adhesive is dispersed over the bare metal weld flanges, which coats them and therefore provides for the corrosion protection.

6.3.5 Supplementary Work

- Wipe off excessive adhesive.
- Corrosion protection measures ⇒ [page 29](#)



- Paint construction.

6.3.6 Instructions for DA 001 730 A1

- ◆ If adhesive is dispersed on both sides over the complete length, then the adhesive is sufficient.
- ◆ For larger parts i.e. roof, it is necessary to work with an assistant otherwise the adhesive will dry before completing the work.
- ◆ Ensure the openings of the double cartridge are clean before installing the mixing nozzle. Install mixing nozzle securely and press out a bead of approximately 5 cm. Then the adhesive can be applied to the adhesive surface.
- ◆ For work breaks of up to 30 min., press out a bead of approximately 10 cm, this ensures new material is mixed. For work breaks of longer than 30 min. change mixing nozzle.
- ◆ 1 cartridge with 37 ml is sufficient for an approximately 4 m long flange.
- ◆ Adhesive must cure before performing further surface work.
Curing time: 68° F (20° C) ≈ 8 h 176° F (80° C) ≈ 20 min.





7 Anti-Corrosion Measures



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

7.1 Anti-Corrosion Protection

The standard anti-corrosion protection must only be restored after repairs with materials which have been approved by the vehicle manufacturer.

7.2 Long-Term Body Protection

- Bear body panels must be primed immediately after repairs (anti-corrosion protection primer ALN 002 003 10 or ALK 007 003 10 or ALK 007 003 10).
- Always remove bores from drilled holes.
- Welding primer (D 007 500 04) must always be applied to both sides of welded flanges.
- All weld seam areas must be primed, both inside and out, before sealing off.
- Reinstate paintwork finish.
- Sealant must only be applied to primed sheet metal parts.
- Overlapping metal, metal edges, butt joints, welded joints, etc., must be completely sealed with sealant.
- Restore underbody protection with long-term undercoat.
- After applying the finishing coat, all cavities in the repaired area must be treated with cavity protection material.
- Parting cuts (e.g. in side panels) must be conserved completely.
- After the cavity protection material has dried clear the water drains.



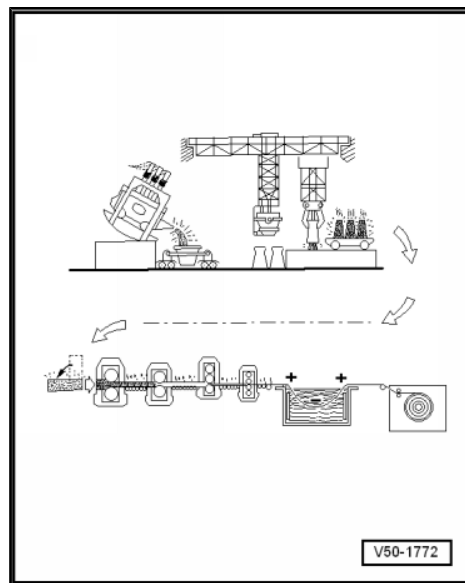
7.3 Electrolytic Galvanizing

During electrolytic galvanizing the sheet steel runs past zinc anode plates (positive electrodes) as a cathode.

The gap is filled with electrolyte, an acidic, electrically conducting fluid containing zinc ions.

So this is an electrochemical process by which zinc is dissolved and applied to the sheet steel with the help of electricity.

The result is a very even and fine, weakly structured zinc layer which may be further treated without problems, for instance cut, pressed, welded, primed and painted.

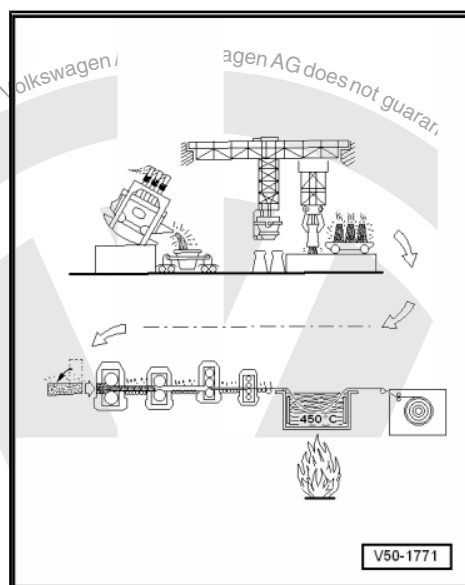


7.4 Hot Galvanizing

During hot galvanizing the sheet steel runs through an approximately 450° C fluid zinc bath. The sheet steel surface is covered by an extremely thin zinc iron alloy which acts as an "Adhesion promoter" of the pure zinc layer which ultimately has a thickness of 10 mm per side.

The characteristic hot galvanizing zinc flowers are undesirable for body parts and are thus, to a great extent, avoided by using various tricks, e.g. re-rolling.

The hidden body parts of the floor groups, door pillars and bracing plates are hot galvanized on both sides.





8 Disposal Information



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

8.1 Environmental Protection Practiced During Production

- Discontinuance or reduction of chlorofluorocarbons -CFCs- in soft foam propellants (e.g. for seat upholstery), in separating agents in the manufacture of plastic parts and cleaning agents in the production facilities.
- Introduction of solvent free adhesives and production aids; thereby considerably reducing emissions (pollution vaporization), reduction of smell pollution and fogging on glass areas.
- Introduction of recyclable materials for plastic parts like:
 - Bumper covers
 - Instrument panel
 - Engine capsule and similar
- Items already being manufactured from recycled plastic:
 - Wheel housing liners
 - Luggage compartment floor covers
 - Insulating mats etc.
- Introduction of recycling-friendly materials also reduction of the number of types.
- Recycling-friendly construction for easier disassembly.

8.1.1 Recycling

- Prevents pollutant burden
- Reduces storage area needs
- Saves raw materials

8.1.2 Basic Environmental Protection Rules

- ◆ Prevention before reduction
- ◆ Prevention before reuse
- ◆ Reuse before disposal

8.2 Recycling

For the manufacture of a Volkswagen Golf e.g., apart from metal, rubber and glass about 10% (by weight) of plastic materials are used.

As an important contribution to reducing the burden on the environment plastic parts are manufactured predominantly from reusable -recyclable- or already reprocessed -recycled- base materials.

For the logistics, recycling concepts introduced, must be as simple as possible for the Service Organization and the recycling company.



With the introduction of the Golf from MY 1992 Volkswagen has realized the following self imposed demands:

- The construction is such that removing parts is easier.
- The many different types of plastic parts has been reduced.
- The plastic parts are marked by the manufacture for identification according to VDA-260.

With help of this material designation -standard coding- the parts can be collected by types separately and then supplied to the manufacturer or a recycling company for reprocessing.

The identification field contains:

- ◆ Manufacturer abbreviation
- ◆ Part number
- ◆ Date manufactured
- ◆ Material code

For example > PP+ EPDM- -T20- < signifies:

It is dealing with a recyclable

- ◆ Polypropylene -PP
- ◆ modified elastomer -EPDM
- ◆ talcum reinforced - -T20-



8.3 Plastics

8.3.1 Table 1- Frequently Used Base Polymers (Thermo- and Duroplastics)*

Abbreviation	Designation
ABS	Acrylonitrile/butadiene/styrene
EP	Epoxide; Epoxy resin
PA 6	Polyamide with 6 C-atoms in monomer component
PA 11	Polyamide with 11 C-atoms in monomer component
PA 12	Polyamide with 12 C-atoms in monomer component
PA 66	2 Monomer component polyamide each with 6 C-atoms
PBT	Polybutylene terephthalate (linear Polyester)
PES	Polyethersulfone
PET	Polyethylene terephthalate
PC	Polycarbonate plastics
PE	Polyethylene
PF	Phenol-formaldehyde resin
PMMA	Poly (methyl methacrylate)
POM	Polyoxymethylene; polyformaldehyde

1) Abbreviations according to DIN 7728 / ISO 1043

8.3.2 Continuation of Table 1*

Abbreviation	Designation
PP	Polypropylene



Abbreviation	Designation
PPE	Polyphenylene ether
PPS	Poly (phenylene sulfide)
PTFE	Polytetrafluoroethylene
PUR	Polyurethane
PVC	Poly (vinyl chloride)
SAN	Stirene/acrylonitrile

2) Abbreviations according to DIN 7728 / ISO 1043

8.3.3 Table 2- Frequently Used Fillers and Reinforcing Materials*

Abbreviation	Designation
GF	Glass fibre
GM	Glass mat
GB	Glass spheres
T	Talc
M	Mineral
WD	Wood powder
SAN	Stirene/acrylonitrile

3) Abbreviations according to DIN 7728 / ISO 1043

8.3.4 Table 3- Frequently Used Elastomer-Base Polymers*

Abbreviation	Designation
ACM	Copolymers from ethylacrylate or other acrylates with a small part of a monomer, which makes the vulcanization easier
AU	Polyesterurethane-rubber (India rubber)
BR	Butadiene-rubber (India rubber)
CSM	Chloride sulphonated polyethylene
CR	Chloroprene-rubber (India rubber)
EPDM	Terpolymers from ethylene, propylene and one diene, with one unsaturated part of the diene in the side chain
ECO	Copolymers from ethylenoxide (oxirane) and chloromethyloxirane (epichlorhydrine)
FPM	Rubber with fluorine, fluoroalkoxy-groups on the polymer chain
MVQ	Silicon rubber with methyl and vinyl groups on the polymer chain
NBR	Acrylonitrile-butadiene-rubber
NR	Isoprene-rubber (natural rubber)
SBR	Stirene-butadiene-rubber

4) Abbreviations according to DIN-ISO 1629

8.4 Disposal

The first step to enable a part of the vehicle to be fed into a recycling circuit after repairs or servicing, is that the Volkswagen dealers collect materials according to types!

This sorting is to be carried out according to the following material groups:



- Sheet steel or iron material ("steel scrap"): scrap dealer and Shredder operator
- Aluminium: engine reconditioning company; scrap dealer or special engine scrap dealer
- Tires: in some cases for retreading
- Plastics: PP bumper and presently via VW collection logistics; further plastic recycling is being prepared
- Batteries: existing recycling circuit via regional disposal
- Old oil: existing method of disposal
- Brake fluid: material circuit being prepared
- Anti-freeze: material circuit being prepared
- Refrigerant: existing method of disposal
- Refrigerant oil for R12: as for engine oil
- Refrigerant oil for R134a: material circuit being prepared
- Oil filled dampers e.g. bumper dampers: release oil and feed into existing method of disposal
- Oil filled dampers e.g. gas struts: release gas, collect escaping oil and feed into the existing method of disposal
- Separate differing types of material to make possible type-sorted reuse. For example remove tires from wheels and feed into disposal system separately.

8.5 Releasing Gas from Strut

- Clamp gas-filled strut in vice in area $x = 50$ mm.



Caution

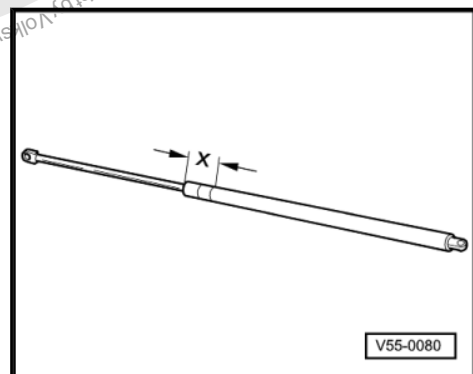
Clamping in vice may only be carried out in this area, otherwise there is danger of accident!

- Saw through cylinder of gas-filled strut within first third of cylinder's overall length using piston rod end of cylinder as reference point.



Note

- ◆ Protective goggles must be worn during sawing process.
- ◆ Cover area of saw cut with a cloth.
- ◆ Dispose of oil and cloth via existing disposal channels.



8.6 Airbag



Caution

Scrapping airbag units which have not been ignited is a hazard.



8.6.1 Disposal

For disposal procedures, refer to ⇒ Body Interior; Rep. Gr. 69 ;
Airbag .

Pyrotechnical components which have already been ignited in an accident can be disposed of as scrap or commercial waste (if similar to household waste).





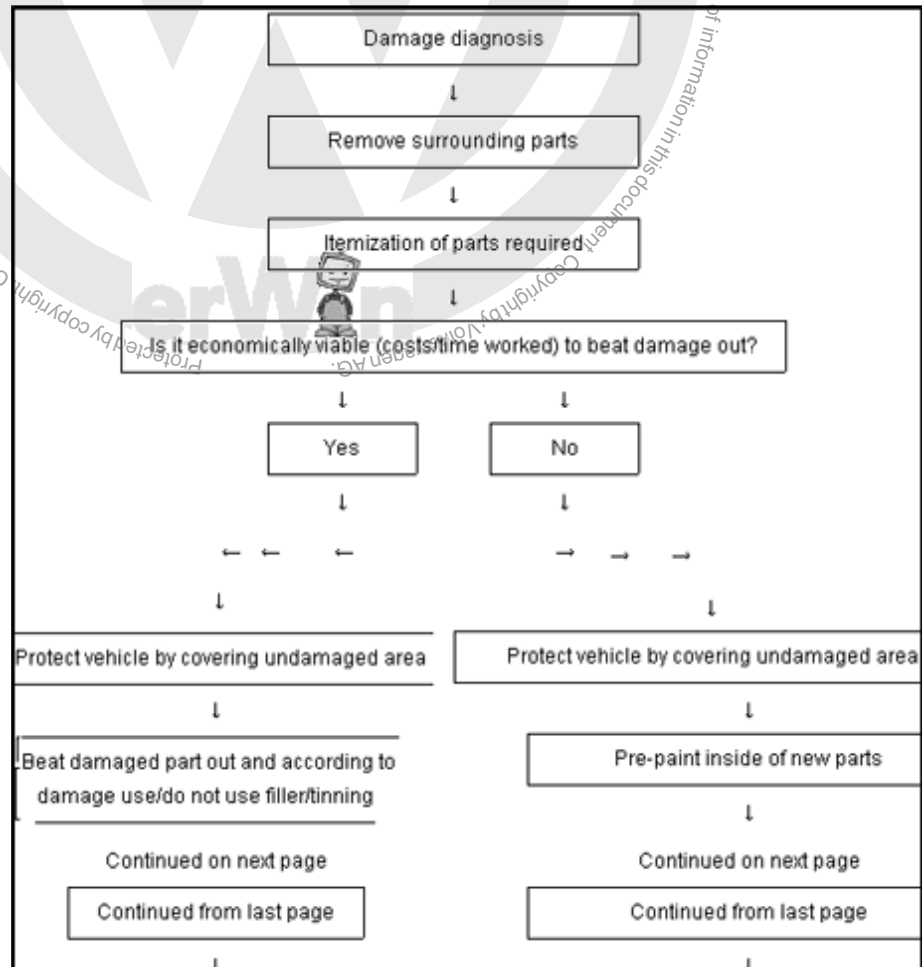
9 Repair Procedures

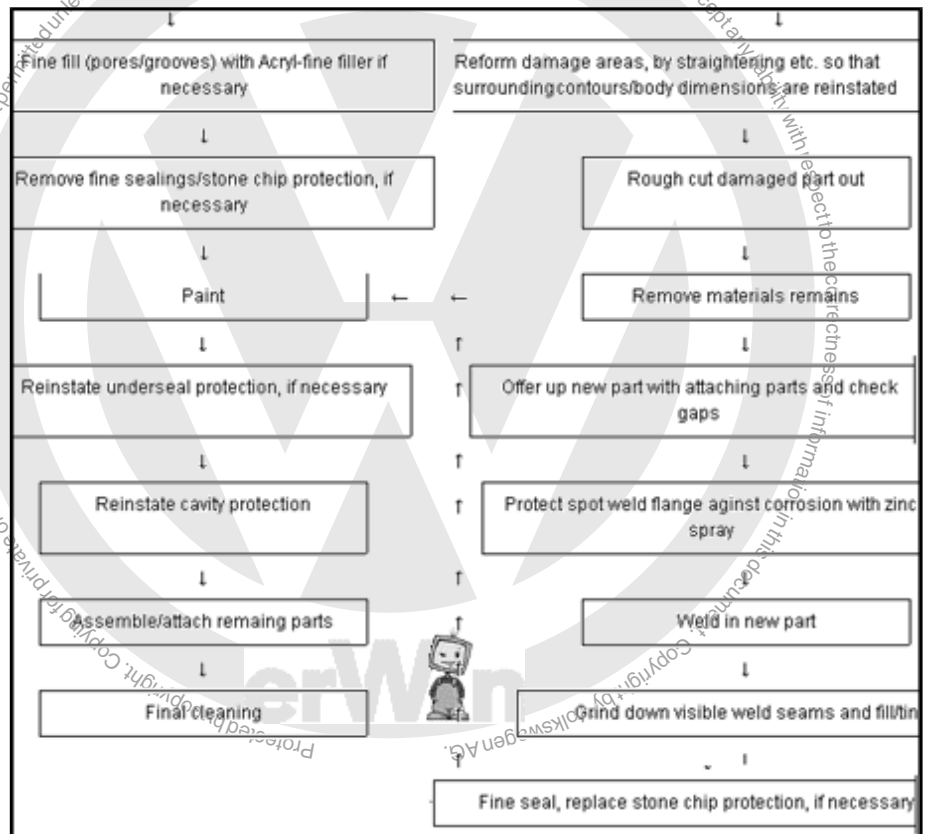


Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

9.1 Accident Repairs







10 Contact Corrosion Protection



Note

This document contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

10.1 Connections/Joints of Aluminum/Magnesium and Steel



Note

- ◆ *When connecting/joining aluminum or magnesium with steel the following description for the corrosion protection measures must be observed.*
- ◆ *A protective foil must be used at the bolted points between aluminum and steel or magnesium and steel:*
 - ◆ *Fender*
 - ◆ *Hood*
 - ◆ *Doors*
 - ◆ *Trunk lid/tailgate*
- ◆ *Use only "dacromet" coated bolts when joining aluminum or magnesium to steel, these bolts may only be used once. Dacromet is a green chemical coating which protects against contact corrosion.*
- ◆ *Non-metallic connections/joints or sealing elements (door seals, trunk lid/tailgate seals) between two different metals must not be electro-conductive.*



11 Sheet Metal Repairs



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

11.1 Strengthened Steel Body Panels

Strengthened steel body panels are being increasingly used in our vehicles.

The areas of use of these parts are shown in the illustration in:
 ⇒ Body Repair; Rep. Gr. 00 ; Reinforced High-Strength Body Panel.

What is strengthened steel?

Optically normal sheet metal, but due to the addition of various alloys, it has a higher limit of elasticity than standard body metal. In other words, with an equivalent impulse, the dent in strengthened steel will not be so deep as that in standard body metal.

What special points should be observed when removing dents?

Dents can be removed with the usual tools. Due to the greater buckling strength, there is more bounce, so that more force might be necessary. If creases are formed when straightening, the material could fracture.

What special points should be observed when straightening or working on an alignment bank or hydraulic press?

Due to the greater bounce of strengthened steel, it has to be overstretched more than standard metal to get it into the position required. However, the greater force applied also affects parts made of standard metal which are welded to the strengthened steel parts. This increases the stress on these parts. To prevent the standard metal parts from giving or fracturing, an additional anchor position must be provided.



Caution

- ◆ ***If strengthened steel is overstretched, it will suddenly extend to a length greater than that required!***
- ◆ ***For reasons of safety, it is not permitted to heat up strengthened body steel to reshape it. In this respect it is no different to standard body steel!***

What special point should be noted when painting?

Strengthened steel will expand if it is heated too quickly by a drier radiator. If a panel is spot welded or securely bonded to a reinforcement behind it, dents will be formed at these points. These will remain visible after the panel has cooled down. For this reason, drier radiators are only to be brought to power gradually. There are no restrictions on drying in a drier booth.



11.2 Galvanized Body Parts

11.2.1 Preparation

Only remove underbody protection/sealing materials with a hot air blower (max. 420°C) or with rotating wire brush.

- Remove paint and primer with paint remover (LLE 812 000 A2) or rotating plastic brush.

11.2.2 Parting Cuts

- Where possible, avoid hot separation techniques (cutting torch) - course cuts only.

To prevent damage to the zinc coating in the separating area, mechanical separating procedures are preferred, e.g. spot weld miller, body saw.

11.2.3 Joint Techniques

Electric resistance welding (RP) causes only slight burning of the zinc coating at the center of the spot welds. The protective zinc ring which is simultaneously built-up around the spot weld provides protection against corrosion.

Whenever possible, always use resistance welding techniques (RP).

Note various thicknesses of zinc layers when electric resistance spot welding (RP) - carry out trial weld.

Only use shielded arc welding (SG) instead of electric resistance spot welding (RP) when nothing else is possible.

Always apply welding primer between joint flanges (zinc spray D 007 500 04).

Apply Vario body filler (ALN 787 200 10) to joints.

11.3 Welding Galvanized Body Panels



WARNING

As toxic zinc oxide is produced when welding galvanized body panels, good workplace ventilation and smoke extraction via a suitable extraction system, e. g. -V.A.G 1586-, must be provided.

11.3.1 SG Inert Gas Welding of Galvanized Panels

The following welding criteria must be closely observed, in order to achieve high quality shielded arc welded joints:

- ◆ Increase current strength (Ampere) on welding transformer.
- ◆ At the same time the wire feed must be regulated as voltage increase on its own merely results in a greater arc (less penetration, more porous seam structure).
- ◆ Use cylindrical instead of conical nozzles (spatters on too narrow a gas jet result in pore formation).
- ◆ Guide the torch about 12 mm above the plates being welded at a neutral up to 10° angle.
- ◆ Use the softest wire possible.



- ◆ CO₂ and mixed gases may be used as inert gas.

11.3.2 RP Welding of Galvanized Panels

When resistance spot welding galvanized plates the following points must be observed:

11.3.3 Welding Transformer

- ◆ Increase welding current -Ampere- by 10 % to a max. 30 %.

If the welding transformer permits welding time regulation longer welding time is more advantageous.

- Welding time prolongation (reference values):
- 0.6 mm - min. 7 periods
- 0.8 mm - min. 9 periods
- 1.0 mm - min. 11 periods

Welding time is correct if the welding spots may be placed without spattering.

11.3.4 Welding Tongs

- ◆ Use hard copper electrodes (copper-chrome-zirconium plated) with high temperature resistance (>400°C).
- ◆ Frequently clean hard copper electrodes and rework edge of contact surface diameter (4 mm Ø).
- ◆ Increase electrode pressure.

11.4 Unbuttoning Test

How favorable the welding results are may be determined by welding specimen plates and then carrying out a rolling test.

The narrow, welded test strip is vertically rolled or torn off the second sheet metal strip.

Perfect quality welded spots do not tear in the area of contact but are "Unbuttoned".



12 Aluminum Repairs



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.



Note

- ◆ *These instructions are valid only for conventional steel vehicles on which aluminum body panels are installed.*
- ◆ *The range of application of these panels is depicted in an illustration in the respective Body Repair Manual, Repair Group 00.*
- ◆ *For repairs to all-aluminum bodied vehicles the Repair Manual remains valid.*



Caution

Use tools for steel or aluminum (not for both).

Recommendation: Aluminum tool set in tool cart - V.A.G 2010/2-

12.1 Paint

The paint system is identical with the steel body.

Only authorized and aluminum compatible materials may be used.



Caution

Remove adhesive points on GND wiring first after painting.

12.2 Surface Preparation

Use stainless steel wire brushes only.

Rough discs must not be used because of the smear effect.

Use sanding discs of grade P80 to P200.

Use sanding discs, drills, millers and separating discs with cleaning block DA 009 802 only.

Clean surface with Nitro thinners.

Further surface treatment as for steel.



Note

Cover aluminum parts when grinding/sanding and welding steel parts. If metal swarf/dust contacts aluminum, remove immediately or contact corrosion will occur.

**Caution**

Use tools for steel or aluminum (not for both).

Recommendation: Aluminum tool set in tool cart - V.A.G 2010/2-

12.3 Removing Dents

With aluminum there is a greater danger of material stretch than with steel.

Sharp edged or hard panel beating tools (e.g. steel hammer) should not be used and should be replaced by a plastic, wooden or aluminum hammer.

Direct panel beating procedures i.e. aluminum panel lies between counter-hold and panel beating hammer should be reduced to a minimum.

Panel beating aluminum panels begins in the middle of the dent as opposed to steel.

Aluminum panels should more often be pressed rather than beaten.

When dressing/finishing the counter-hold should be held lightly. Forced/hard dressing can cause the metal to dent/bend and for this reason a counter-hold of hard wood should only be used.

If the material has stretched this can be rectified by heating and pulling.

**Caution**

Heat shrinkage temperature maximum 302 °F (150 °C).

If a crack/rip appears during panel beating, the part must be replaced!

12.4 Temperature Regulation for Heat Treatment

No color changes are evident when heating aluminum.

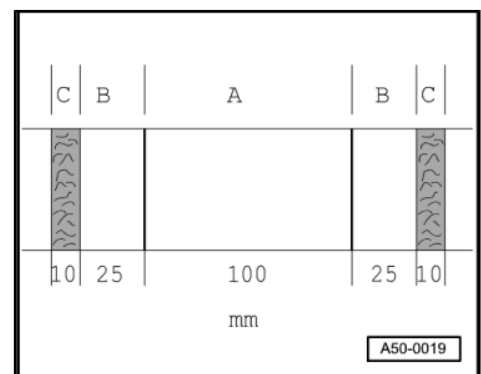
Therefore the temperature must be determined using thermo-pins or thermo-strips.

Thermo-pins and thermo-strips change color at a predetermined temperature

A - Area

B - Free zone

C - Thermo-pin or thermo-strips





13 Procedures for Repair of Synthetic Materials



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

13.1 Materials



Caution

Observe valid general accident prevention procedures.

Safety relevant parts e.g. energy/force absorbing, which after repairs cannot guarantee their function, must not be repaired.

Synthetic material repairs using the plastic repair set D 007 700 is understood to mean, repairs to painted plastic body parts i.e.



bumpers and mirror housings. Before repairs are commenced ensure that the repair can be completed and is economically efficient (repair or replace part).

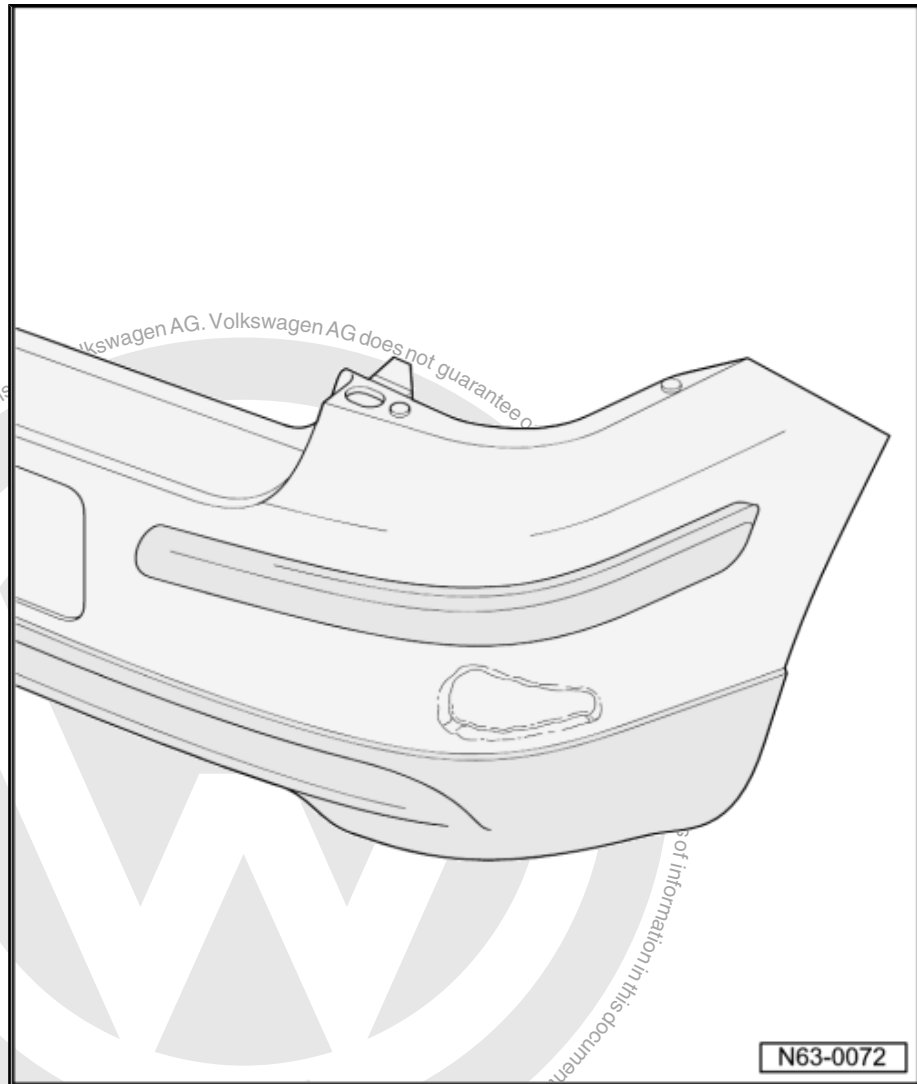
Plastic parts with a structure surface can also be repaired. But the quality level for the surface when compared with a new part cannot be fully attained.



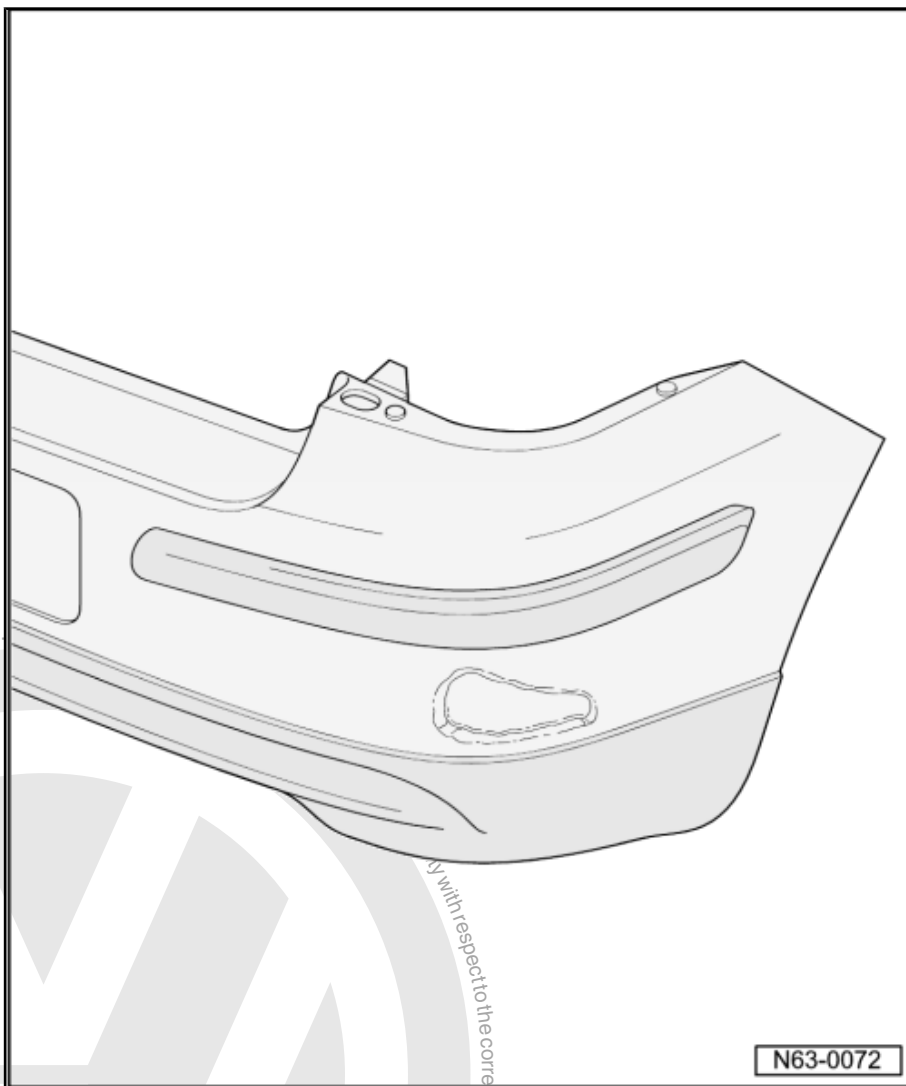
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13.2 Servicing Dents



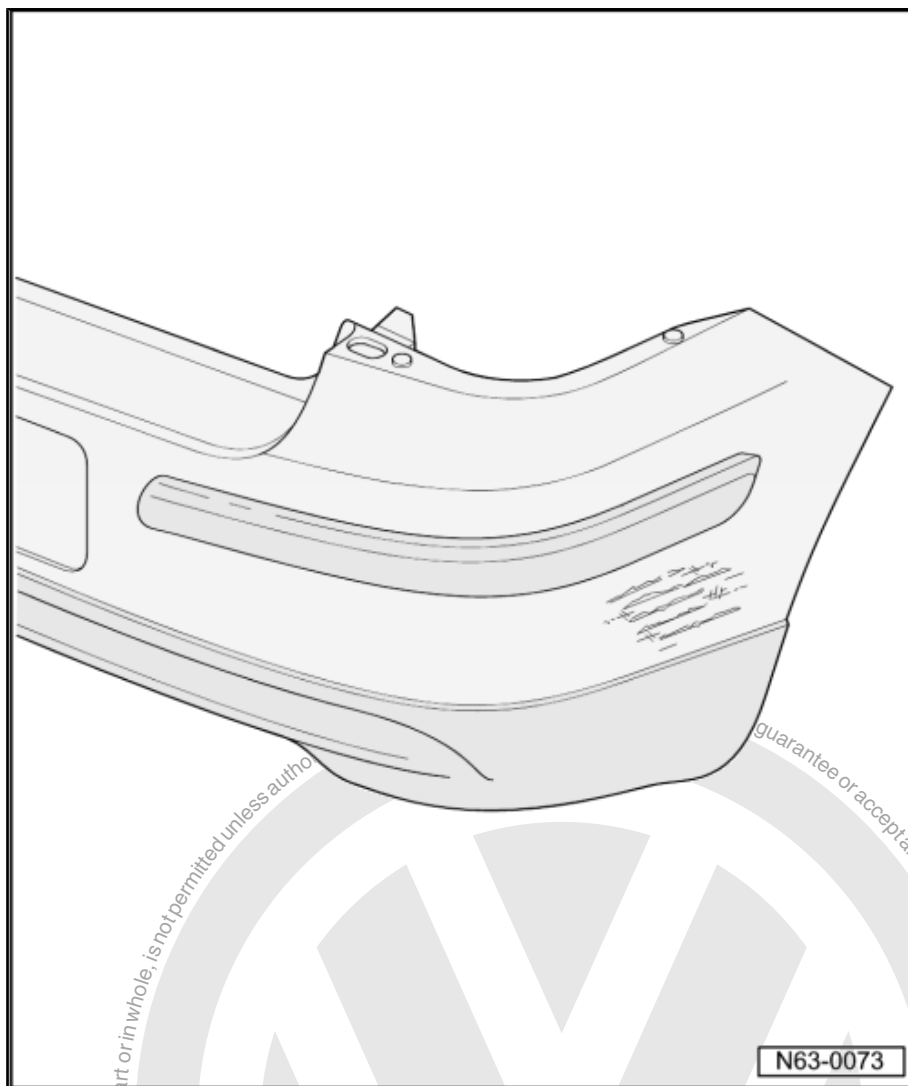
- Clean and dry the item to be repaired.
- Heat the area of the dent with a hot air blower until the dent can be pushed out using a suitable tool.
- Sand down the area of the dent using 120 grade sand/emery paper.
- Then clean the area of the repair with cleaner D 195 850 A1. Flash-off period is 5 minutes.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- Now the uneven surfaces can be filled with adhesive D 180 KU A1 and smoothed with a spatula.



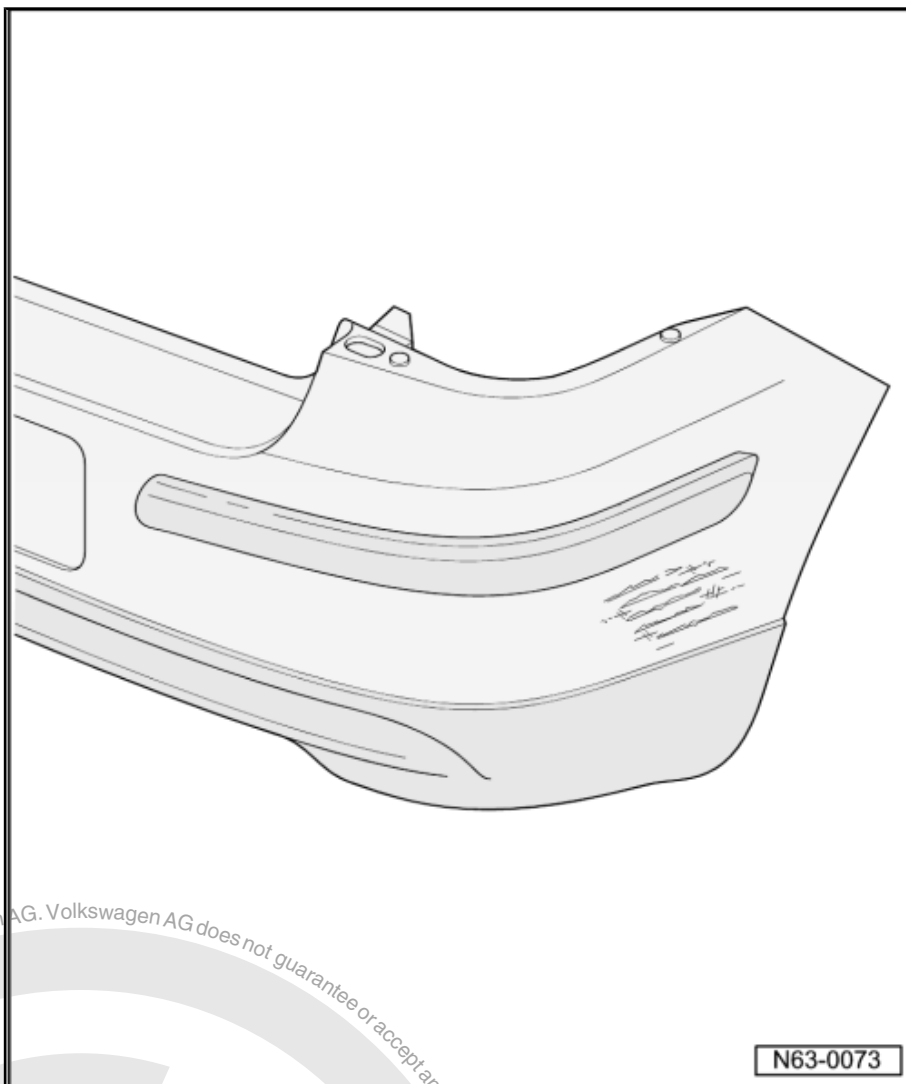
- The hardening process can be accelerated using an infrared lamp. Set to 15 minutes at a temperature of 60°-70°C.
Sand down the area of the dent using 120 grade sand/emery paper.
- Remove all dust/sanding remains.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- Paint structure is to be reinstated.



13.3 Servicing Scratches



- Clean and dry the item to be repaired
- Remove projecting material using 80 grade sand/emery paper.
- Then clean the area of the repair with cleaner D 195 850 A1. Flash-off period is 5 minutes.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- Now the uneven surfaces can be filled with adhesive D 180 KU A1 and smoothed with a spatula.
- The hardening process can be accelerated using an infrared lamp. Set to 15 minutes at a temperature of 60°-70°C.

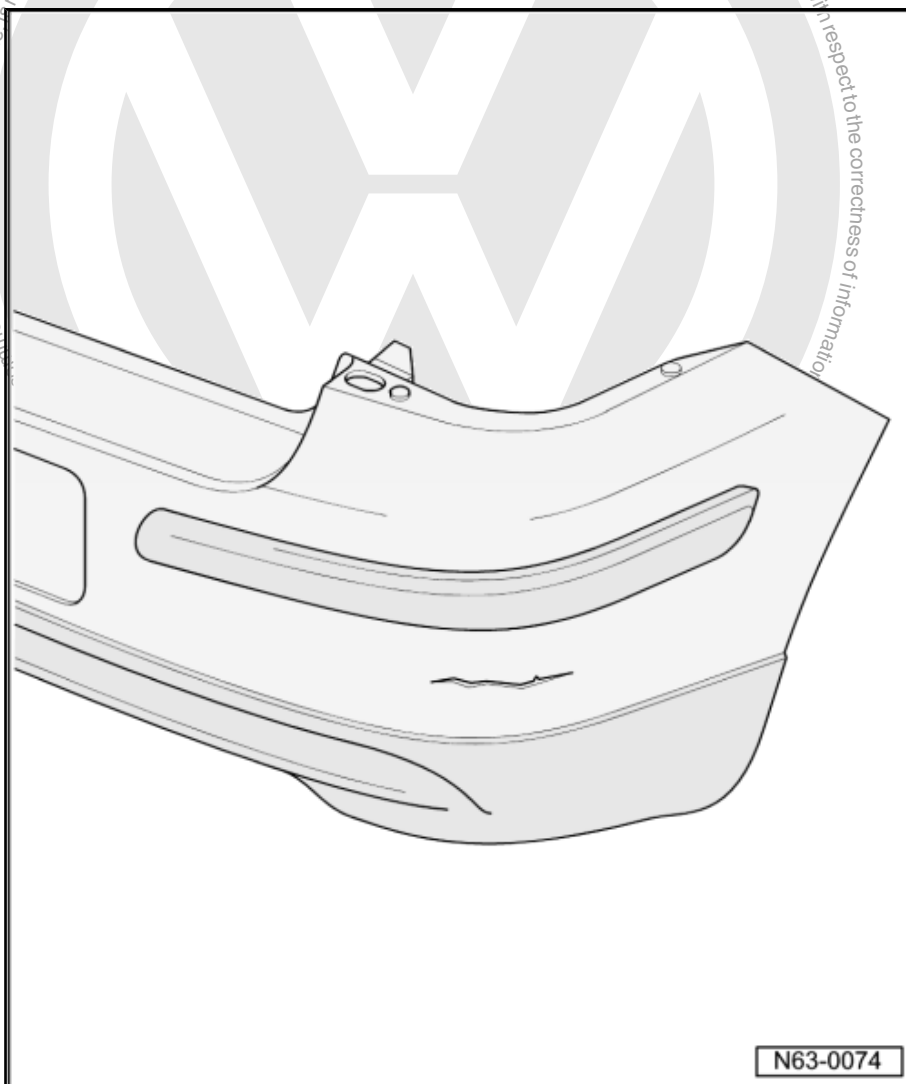


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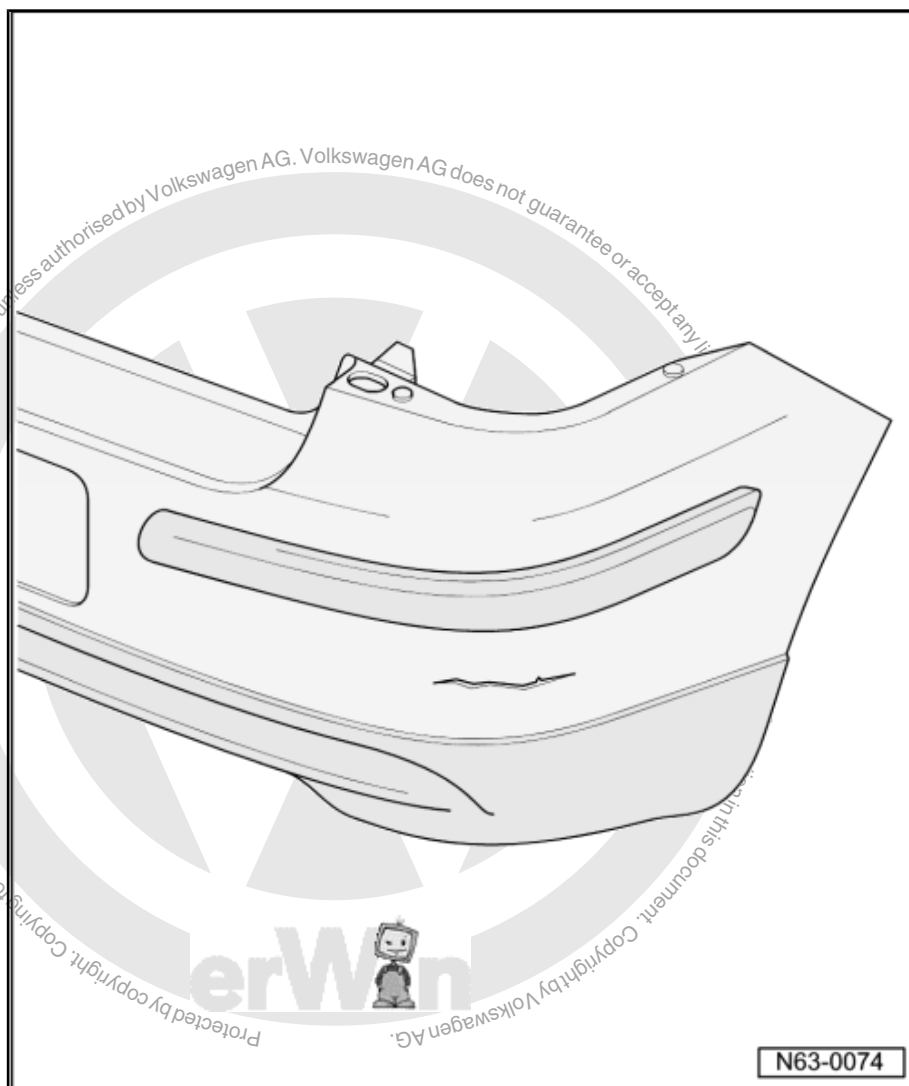
- Sand down the area of the dent using 120 grade sand/emery paper.
- Remove all dust/sanding remains.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- Paint structure is to be reinstated.



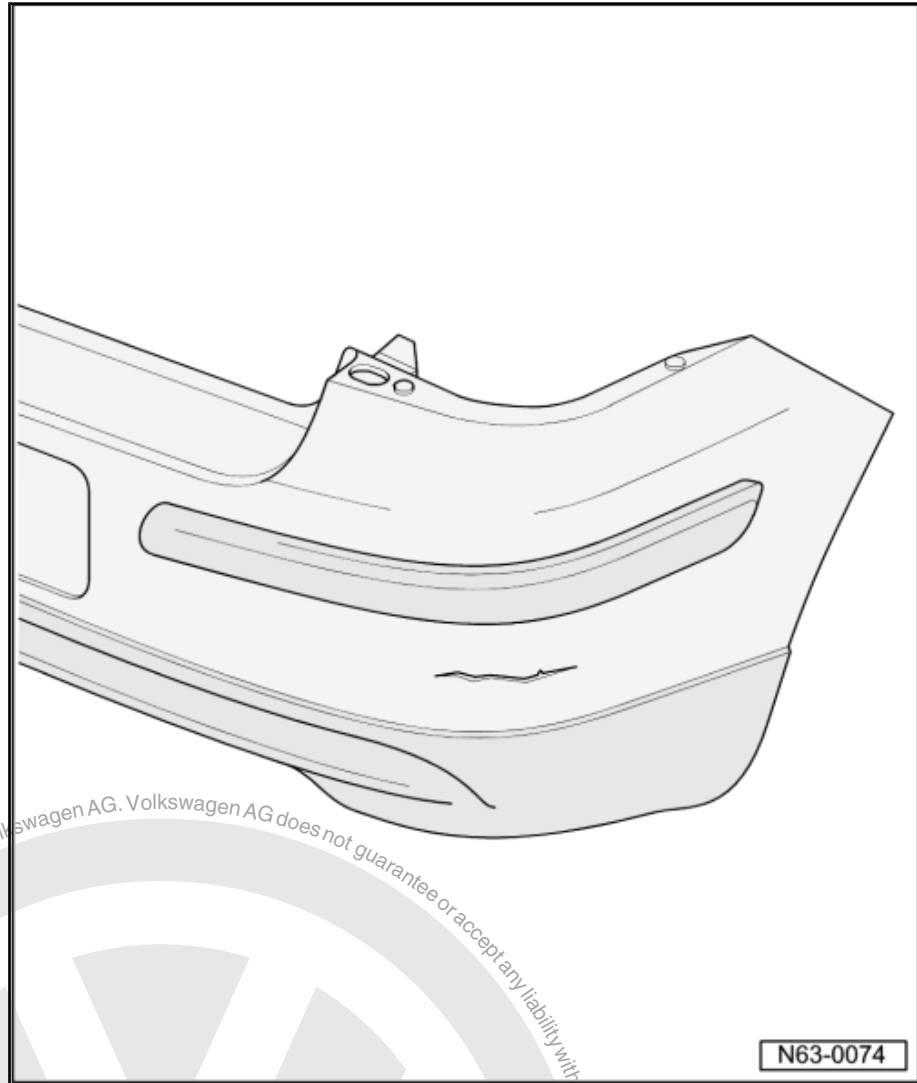
13.4 Servicing Cracks (up to 100 mm)



- Clean and dry the item to be repaired.
- By drilling out the ends of the crack (5 mm) and grinding the crack to a V-form the internal stress and projections are removed.
- Then clean the area of the repair with cleaner D 195 850 A1. Flash-off period is 5 minutes.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- First apply a reinforcing strip from D 002 KD A1 using adhesive D 180 KU A1 to the back of the repair part so that the damaged area is overlapped at least 20 mm.



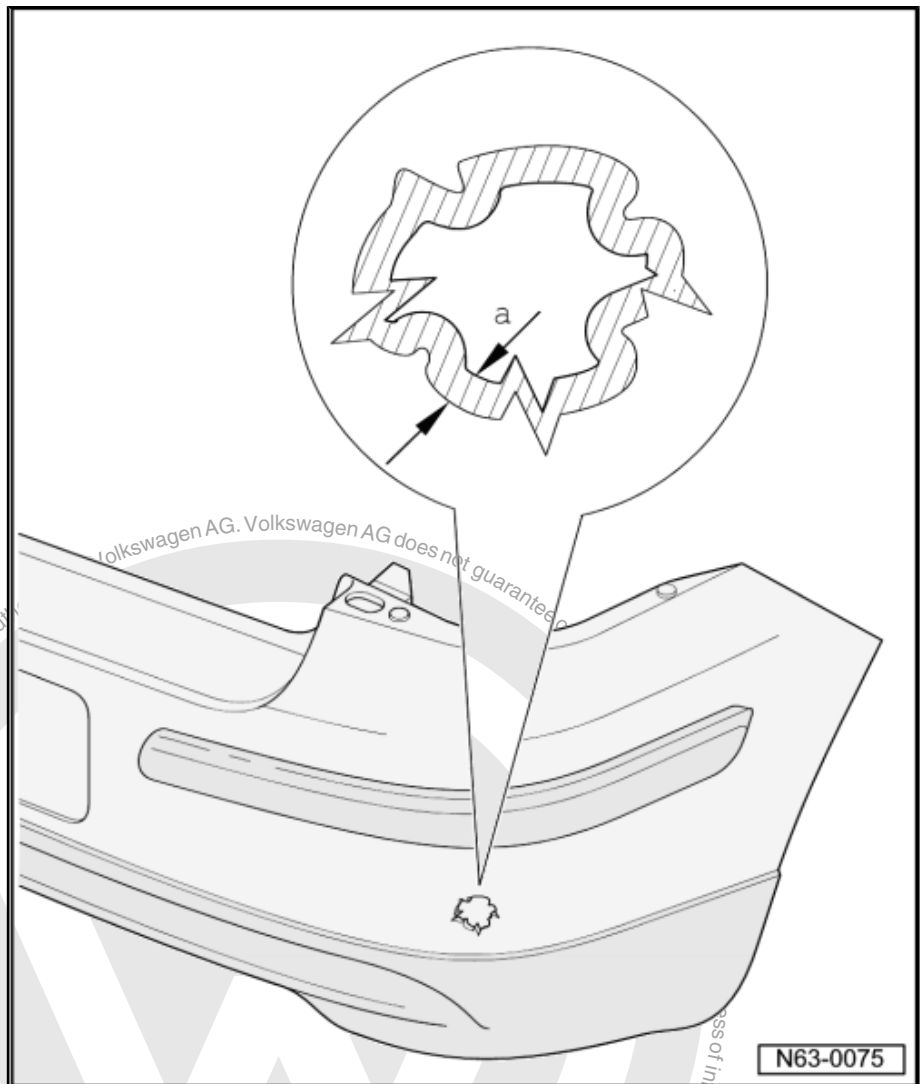
- The hardening process can be accelerated using an infrared lamp. Set to 15 minutes at a temperature of 60°-70°C.
- Then fill the ground-out forward side with adhesive D 180 KU1 A1 and smooth out with a spatula.
- On the forward side an infrared lamp should be used to accelerate the hardening process as before.
- Sand down the area of the dent using 120 grade sand/emery paper.



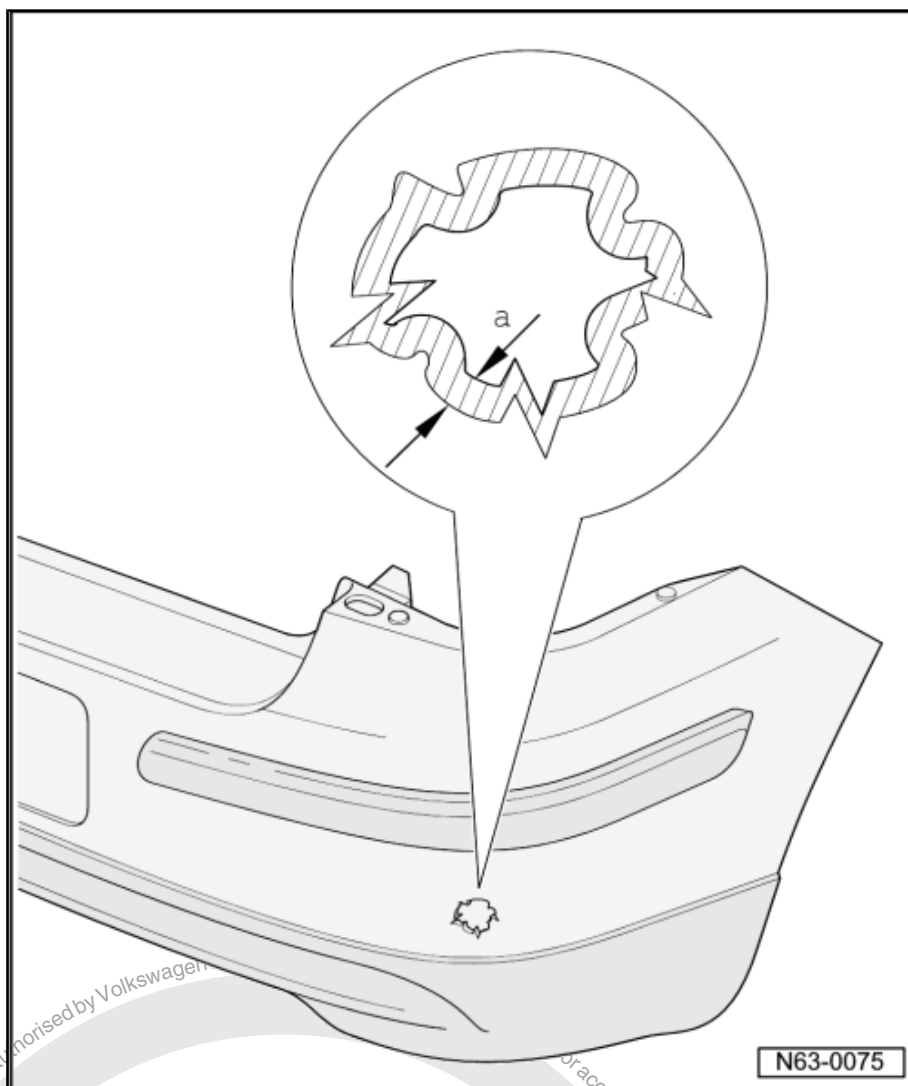
- Remove all dust/sanding remains.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- Paint structure is to be reinstated.



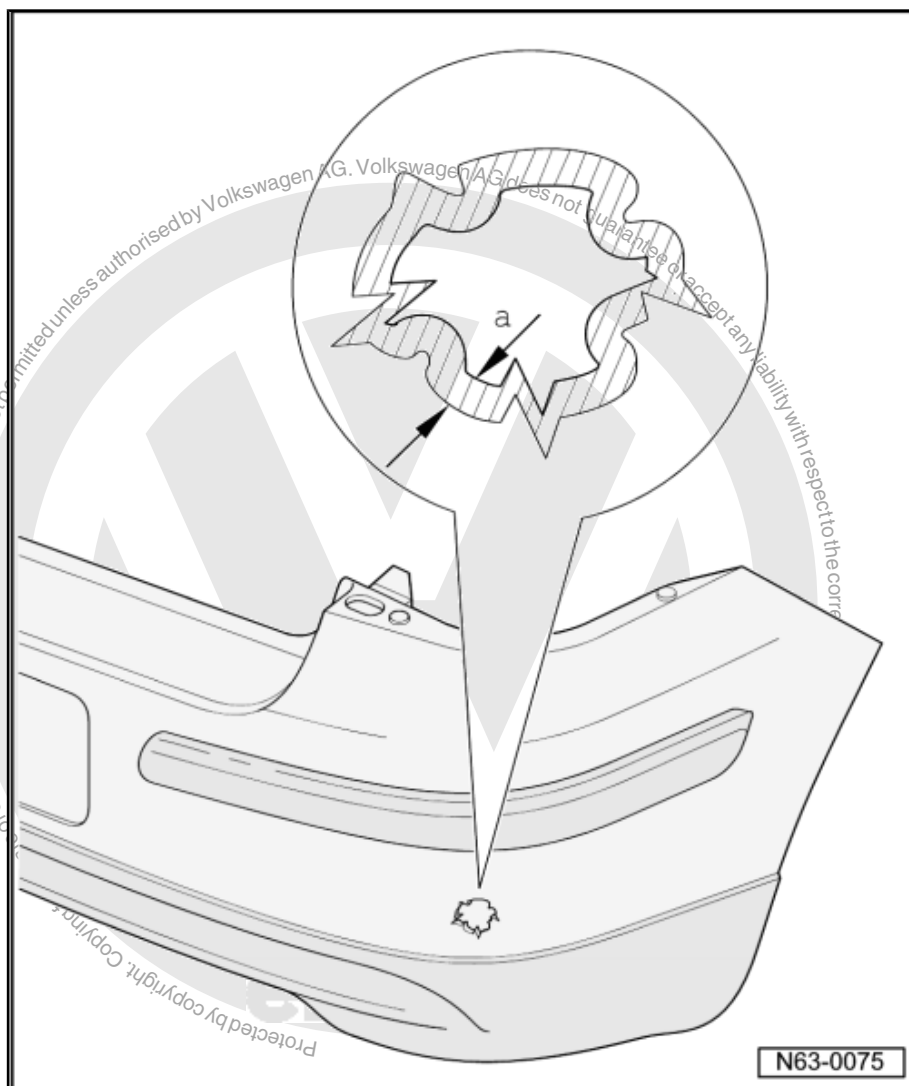
13.5 Servicing Holes (up to 30 mm diameter)



- Clean and dry the item to be repaired.
- Turn the repair area into a funnel shape by chamfering the edges (20-20 mm, dimension a) using 120 grade sand/emery paper.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- Create a rough surface using 120 grade sand/emery paper.
- Then clean the area of the repair with cleaner D 195 850 A1. Flash-off period is 5 minutes.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.



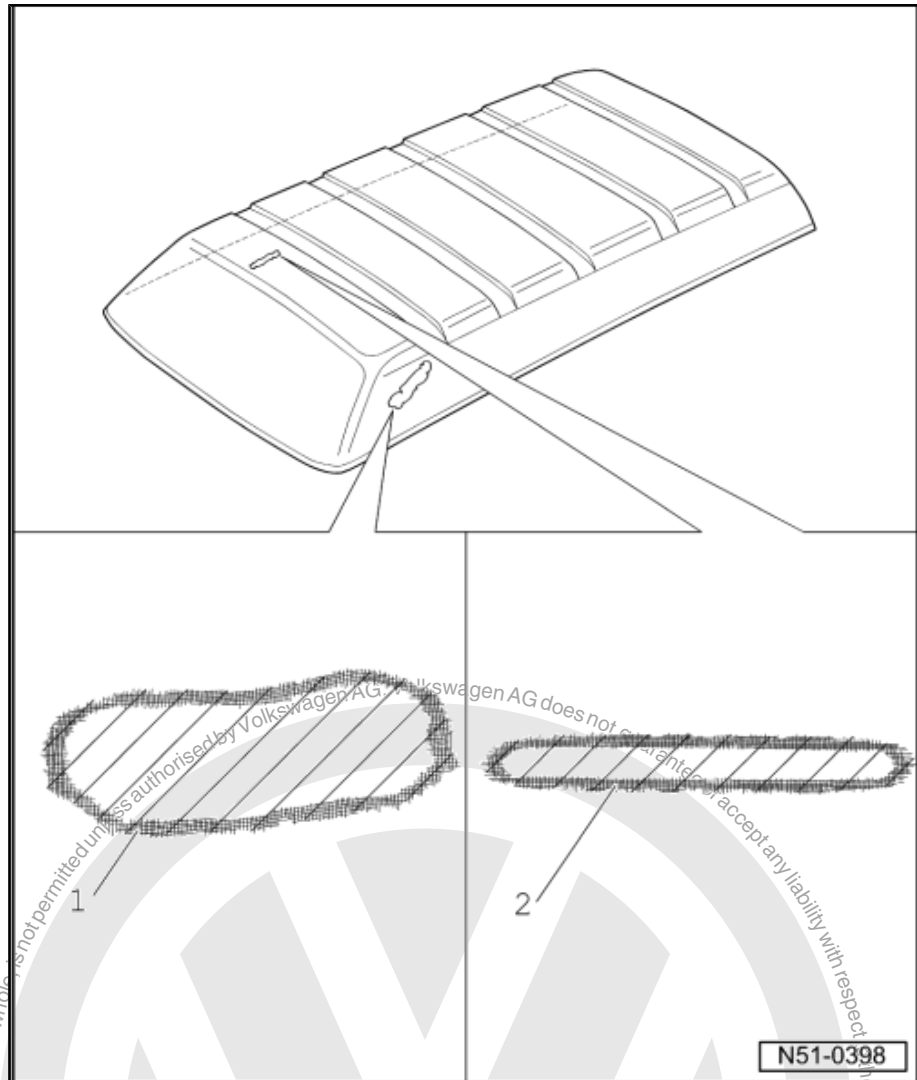
- First apply a reinforcing strip from D 002 KD A1 using adhesive D 180 KU A1 to the back of the repair part so that the damaged area is overlapped at least 20 mm.
- The hardening process can be accelerated using an infrared lamp. Set to 15 minutes at a temperature of 60°-70°C.
- Then fill the ground-out forward side with adhesive D 180 KU1 A1 and smooth out with a spatula.
- On the forward side an infrared lamp should be used to accelerate the hardening process as before.
- Sand down the area of the dent using 120 grade sand/emery paper.



- Remove all dust/sanding remains.
- Apply (spray) a thin coat of bonding agent D 195 150 A1, observe flash-off period of 10 minutes.
- Paint structure is to be reinstated.



13.6 Synthetic Material Repairs (Fiberglass Materials)



Caution

Observe valid general accident prevention procedures.

Safety relevant parts e.g. energy/force absorbing, which after repairs cannot guarantee their function, must not be repaired.

1- Rupture/hole

◆ Fiberglass mat, polyester resin, and hardener

2- Surface damage

◆ Fiberglass reinforced polyester resin, hardener



Note

Observe manufacturer's instructions when using materials.



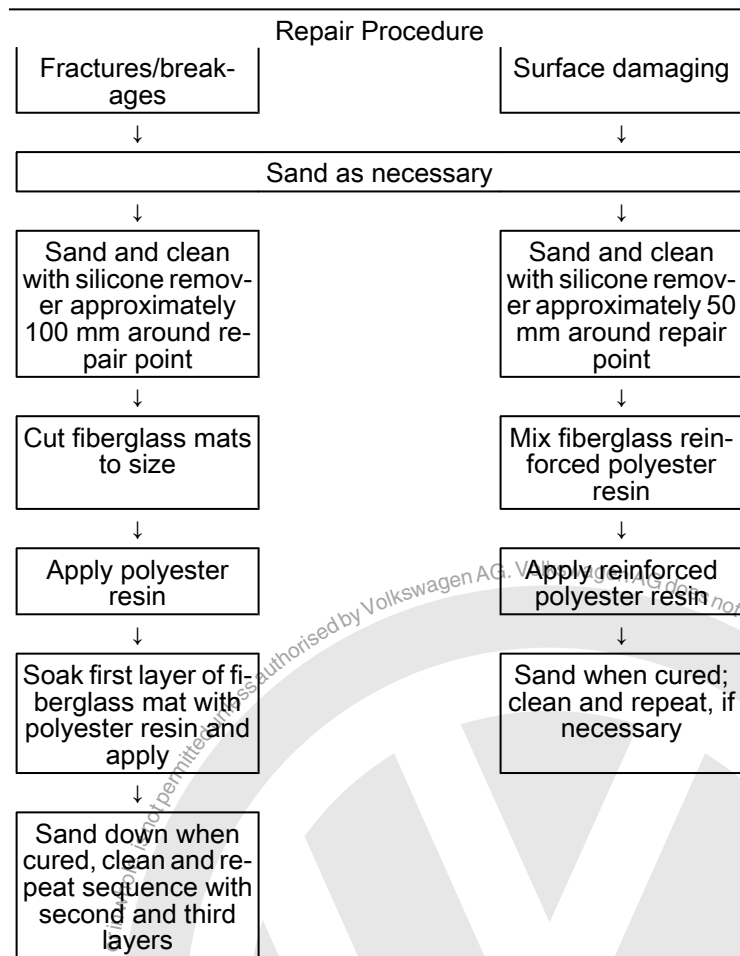
14 Repairing Procedure

14.1 Repair Procedure



Note

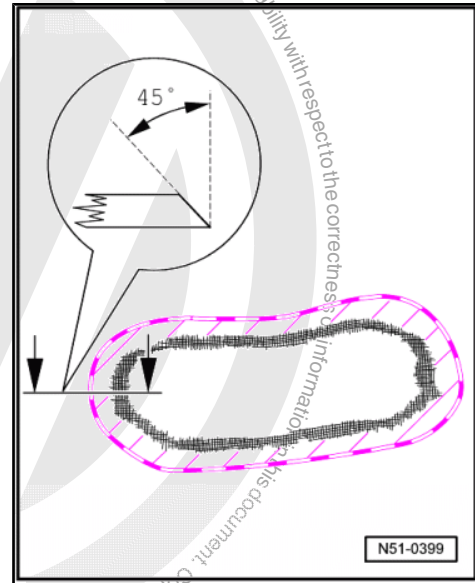
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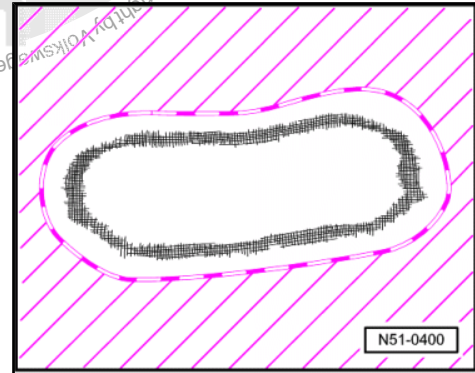


14.1.1 Servicing Rupture/Hole

- Grind peripheral edge of rupture/hole to 45 degrees.



- Sand area approximately 100 mm wide around rupture/hole hatched area- using 150 grade emery cloth and clean with silicone remover.

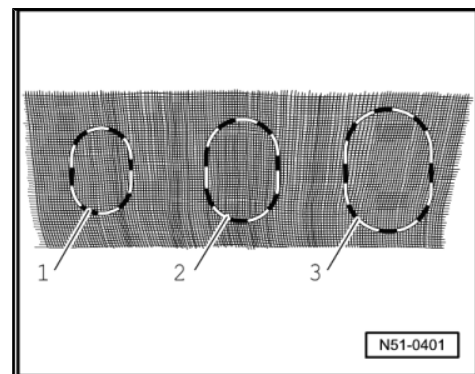


- Cut three fiberglass mats:
 - 1- Overlap rupture/hole approximately 25 mm
 - 2- Overlap approximately 50 mm
 - 3- Overlap approximately 75 mm



Note

For large ruptures/holes it is recommended to use a styrene block as a support. Cover styrene with commercially available unprinted PE synthetic foil so that contact with polyester resin is prevented. Then subsequently secure the prepared support to the inside of the rupture/hole with adhesive tape.

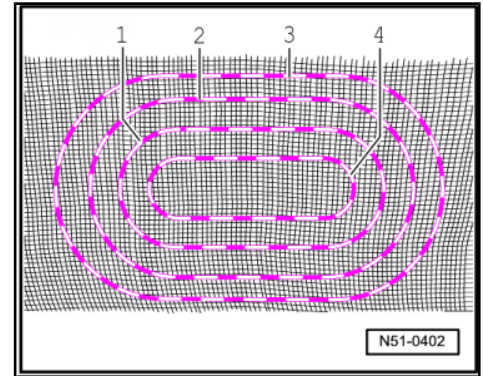


14.1.2 Applying Fiberglass Mats

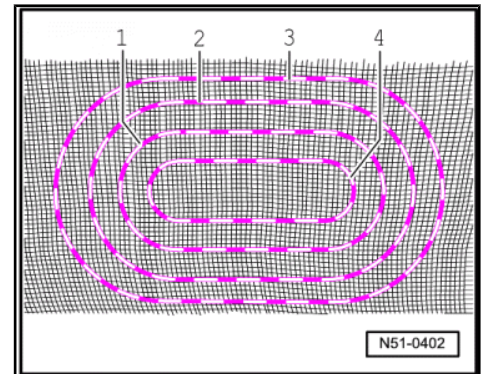
- Mix polyester resin (observe manufacturer's instructions).
- Apply thin coat of polyester resin to rupture/hole.



- Soak smallest fiberglass mat -1- completely in polyester resin and apply to rupture/hole -4-.
- After applying remove air bubbles in polyester resin immediately with a pointed tool.

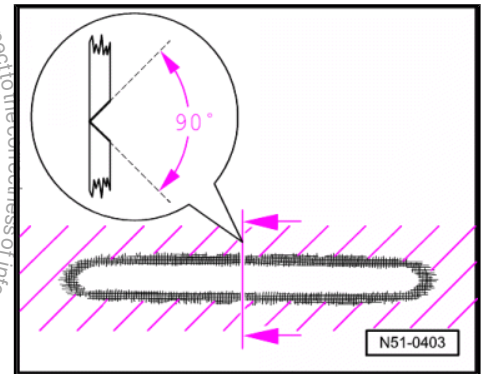


- After applied material has hardened, sand surface using 120 grade emery cloth.
- Clean repair with silicone remover.
- Repeat work sequence for the second -2- and third -3- fiberglass mats.



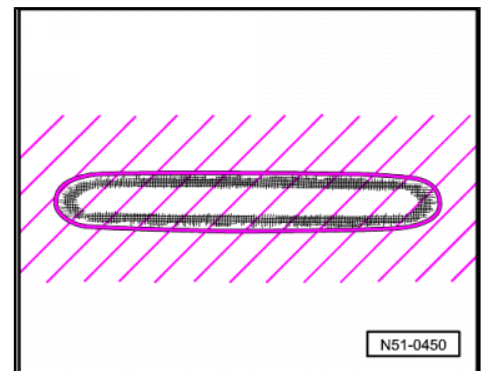
14.1.3 Servicing Damaged Surfaces

- Cut damaged surface to a V form.
- Sand area approximately 50 mm wide around damaged surface -hatched area- using 150 grade emery cloth.
- Clean repair with silicone remover.



Mix fiberglass reinforced polyester resin (observe manufacturer's instructions) and apply to repair section -hatched area-.

- After applied material has hardened, sand repair section and clean with silicone remover.





15 Repairing Glass



Note

The following information contains Volkswagen World Wide content. Not all of the information applies to the US and Canadian Market.

15.1 Repairing Windshields

Apart from replacing a windshield, a cost effective repair is available for windshields which have been damaged by stone chip-pings, provided the conditions are adhered to.

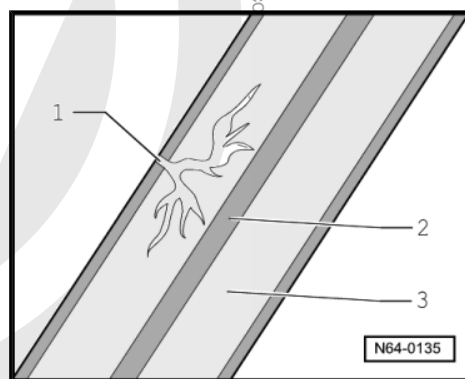
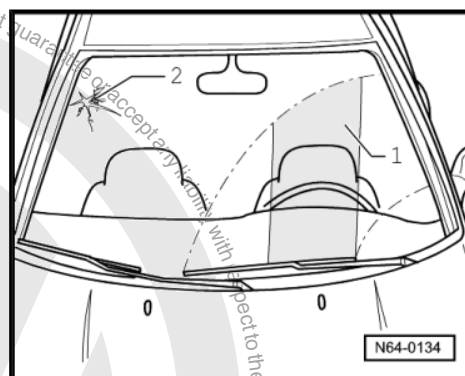
Tinted windows, windows with a colored sun strip or insulated glass can also be repaired, as the tinting is provided by the color of the intermediate foil.

Repairing the windshield, under the following prerequisite, is to be preferred to replacement.

15.1.1 Prerequisites

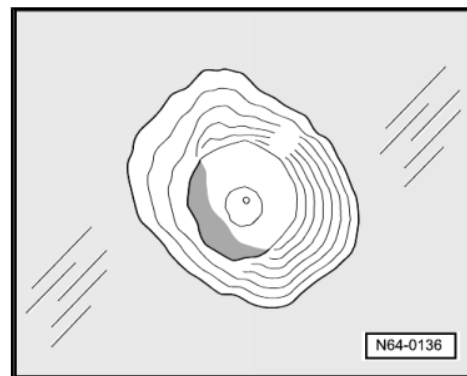
- The damaged area must not lie within the direct field of vision -1-. This field equates to a 29 cm wide strip (standard A4 horizontal) central to driver's line of vision looking forwards, limited at top and bottom by swept area of wiper arm.
- The cracks radiating from the damaged area -2- must not be longer than 50 mm and/or not run outwards to the edge.
- Diameter of damaged area -1- not larger than 5 mm.
- Intermediate foil -2- or inner glass -3- must not be damaged.
- There must be no dirt or moisture in area of lower cracks.
- Therefore the time elapsed since the damage occurred must not be too long.

Repair of the following damage is permitted provided that it does not lie within the field of vision or window edge area:

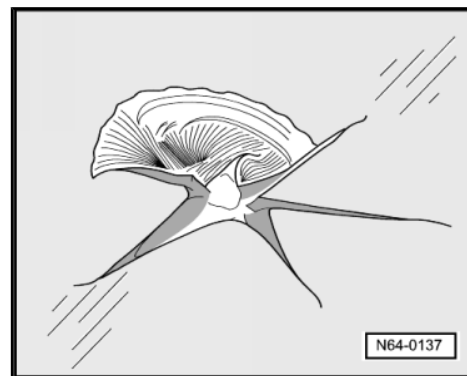




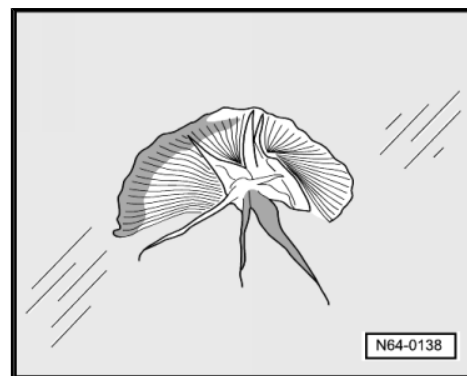
Crater



Combination break



Star and crack



15.1.2 Special Tools and Workshop Equipment Required

- ◆ -VAS 1993- Windshield repair set

Includes the following tools:

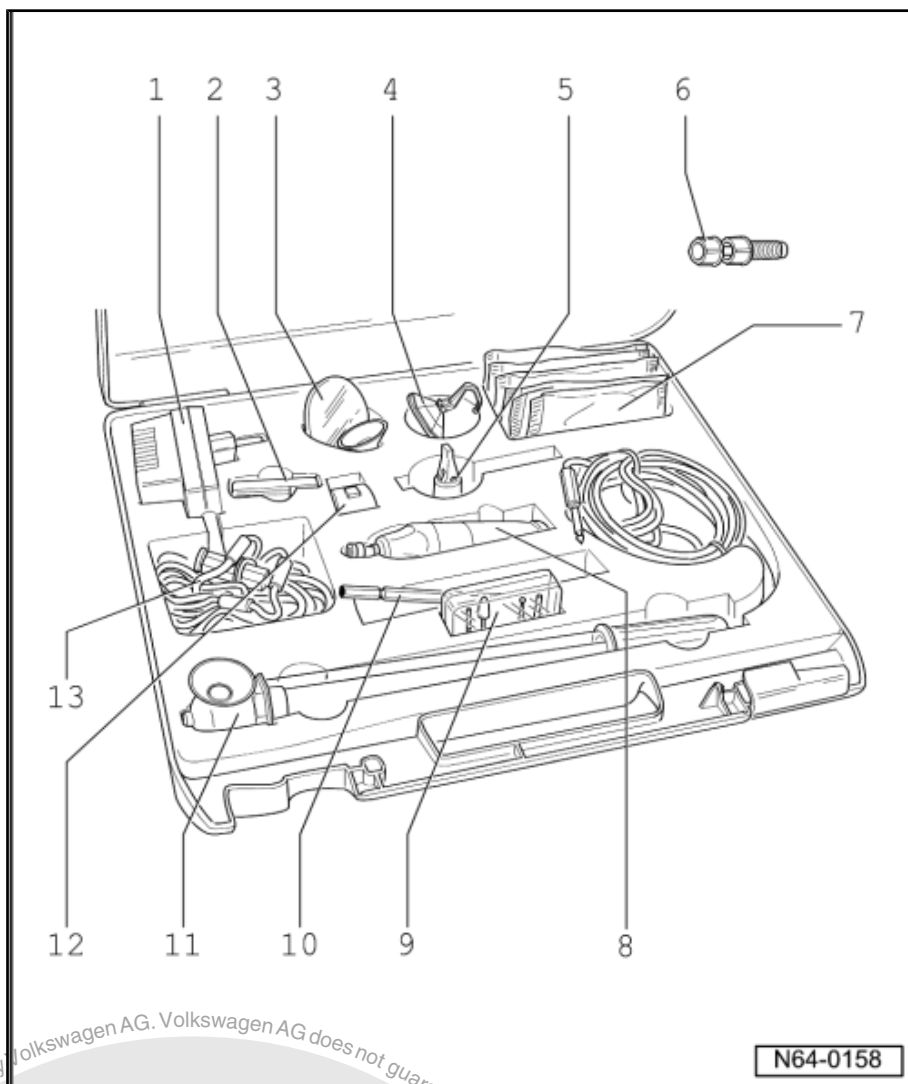
VAS 1993



W00-0592

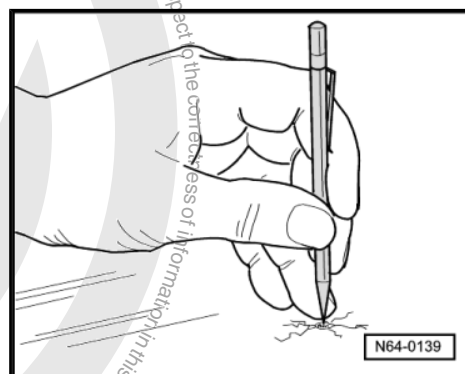


- 14 - Transformer
- 15 - Resin knife (1 set)
- 16 - Mirror
- 17 - Suction hook
 - ☐ Used as a vacuum pump
- 18 - Tool holder
- 19 - Injector
 - ☐ Place in opaque packing after first use
- 20 - Resin, for minimum 15 applications
- 21 - 12V drill
- 22 - Grinding and polishing set
- 23 - Scriber
- 24 - UV lamp
- 25 - Foil
- 26 - Battery connection cable



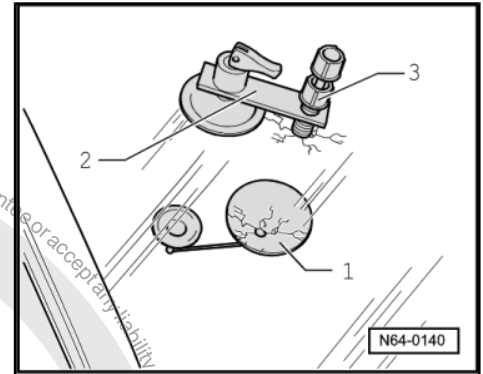
15.1.3 Description of Repairs

- Repairs undertaken in an area not in direct sunlight.
- The repair area must be approximately room temperature.
- The work area must be protected from moisture.
- Loosen point of penetration with hard metal scribe but do not increase size or remove pieces of broken glass.
- Remove any moisture with suction hooked, assisted by a hot air blower from interior. Terminate repair if moisture cannot be removed.

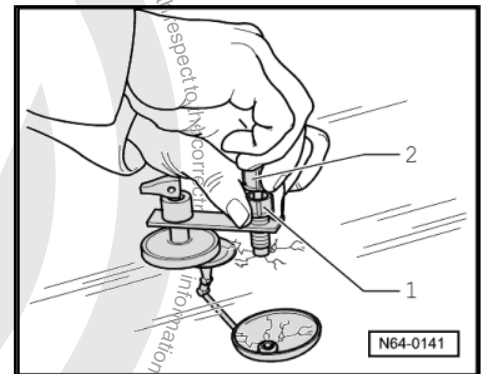




- Install mirror -1- on inside and align so that damaged area can be easily observed.
- Install tool holder -2- with injector -3- so that the injector rubber seal lies exactly over the point of penetration.



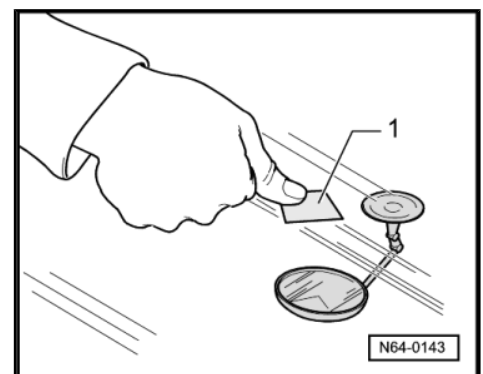
- Remove threaded spindle -2- completely from injector -1-.
- Place 2 to 3 drops of resin in injector -1- (this quantity of resin is sufficient for each damaged area).
- Place resin bottle immediately in its packaging as resin is UV light sensitive.
- Wait until resin has run to rubber seal.
- Tension injector -1- by screwing in the threaded spindle -2-. The correct pressure is achieved when the penetration point is clear, working from the center.



Note

The ingress of resin in the cracks is very slow and may not be seen immediately.

- Wait 10 minutes, then relieve injector up to end of threads.
- Hold injector when loosening so that it does not move.
- Repeat sequence (at least 3 times) until all the air has been evacuated from damaged area. This is recognized by the fact that the cracks become increasingly invisible. A pressure of up to 18 bar is achieved when tensioning.
- Use mirror to see when damaged area is filled, then stop injecting.
- Then swing holder with injector to side and check that resin has flowed into all break points.
- Remove any air locks still present by placing suction hook over repair area.
- Cut covering foil -1- and keep at hand. Remove injector with tool holder and place covering foil immediately over damaged area (do not press on) to stop air entering. The foil contains an activator to harden the resin.
- Place the injector immediately in its packaging, because the resin is UV light sensitive and can be used for the next repair. Place tool holder, in relieved position, in tool box and remove mirror with holder.



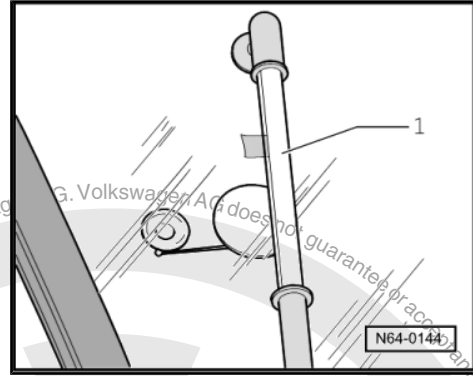


- Secure UV lamp -1- over damage area. Allow UV light to act on resin for 10 minutes then remove UV lamp.
- Flatten damaged area with resin knife, polish with 12 volt drill and polishing set if necessary.



Note

- ◆ *The vehicle can be used immediately after repairs without waiting a curing period.*
- ◆ *There is a possibility that traces of some breakages will remain with some forms of damage but this will not influence the repair result.*
- ◆ *After the repair and after the pressed-in resin has hardened the window can be loaded normally and further cracking is impossible. The hardened resin is colorless and has an identical light refracture index as the glass.*



Cautions & Warnings

Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized Volkswagen retailer or other qualified shop. We especially urge you to consult an authorized Volkswagen retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Volkswagen.
- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.
- Volkswagen is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Volkswagen retailer parts department for the latest information.
- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module (TCM) basic settings using the VAG 1551 Scan Tool (ST).
- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.
- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.
- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it.
- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.
- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.
- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.
- Tie long hair behind your head. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.
- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are designed to be used only once and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual - replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.

Cautions & Warnings

- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.
- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.
- Finger rings should be removed so that they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.
- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly; do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Volkswagen specifications. Makeshift tools, parts and procedures will not make good repairs.
- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store the oily rags, which can ignite and burn spontaneously.
- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque listed.
- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.
- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.
- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.
- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.
- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.
- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).
- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Volkswagen Service technicians should test, disassemble or service the airbag system.

Cautions & Warnings

- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.
- Never use a test light to conduct electrical tests of the airbag system. The system must only be tested by trained Volkswagen Service technicians using the VAG 1551 Scan Tool (ST) or an approved equivalent. The airbag unit must never be electrically tested while it is not installed in the vehicle.
- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.
- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.

I have read and I understand these Cautions and Warnings.