

# Body Repairs - Water Leaks - Water Leaks

## Description and Operation

### General

- If water leaks occur after bodywork repairs, the cause can be established using the checks described below. A systematic and logical procedure is required to locate water leaks. Before beginning extensive checks, a thorough visual inspection must be carried out.
- Visual Inspection
  - The following characteristics may indicate existing leaks:
    - Check the clearance and accurate fit of ancillary components such as the hood, tailgate, liftgate, doors, and so on.
    - Check for correct fit and possible damage to sealing elements such as blanking plugs, rubber door weather strips, and so on.
    - Check water drain holes for unhindered flow.
- Various tests can be used to provide further information on possible leaks:
  - Water test
  - Washer test
  - Road test
  - Chalk (powder) test

### Practical execution of tests and checks

#### Water test



**NOTE:** Never aim a jet of water directly at a door weather strip or rubber seals.

- Carry out the water test with a second person present (in the passenger compartment).
- Use variable washer nozzles (concentrated water jet to fine spray mist).
- Start in the lower section and spray the whole area, working upwards in stages.

#### Washer test

- Further tests can be carried out in the washer system.
- Some leaks originate here, or only occur here.
- The relevant passenger compartment should be checked using a torch during the wash procedure.

#### Road test

- If no leaks are located during the tests above, road tests should be carried out on wet roads.
- Road tests under various conditions:
  - At various speeds.
  - On various road surfaces (asphalt to cobbles).
  - With loaded or unloaded vehicle.
  - Driving through puddles (splash water).

#### Chalk test (powder test)

- In this test, the clamping load and the bearing surface of the seal are checked.
- Performing the test:
  - Dust the door seal with powder or coat with chalk.
  - Coat the bearing surface of the seal with a thin film of petroleum jelly.
  - Slowly close the door and open it again.
  - Check the width and continuity of the imprint on the door seal.

#### Other test equipment

- Other equipment such as stethoscopes, UV lamps, special mirrors or ultrasound measuring instruments can be used to locate leaks.

### Rectifying the leak using recommended tools, auxiliary equipment and materials

- Tools and auxiliary equipment:
  - Dry, absorbent cloths
  - Variable washer nozzle
  - Torch, fluorescent tube
  - Mirror
  - Compressed air
  - Seal lip installer
  - Wet/dry vacuum cleaner
  - Sealing compound compressor
  - Remover for interior trim
  - Cutter blade or pocket knife
  - Wedge (wood or plastic)

- Hot air blower
- Special mirror for concealed leaks
- Air flow checker
- Sealing compound (tape and plastic compound)
- Multi-purpose sticker
- Clinched flange sealer
- Window sealing compound
- Water shield (PVC)
- Double-sided adhesive tape for water shield
- Methylated spirit (available from trade outlets)
- PU adhesive
- Silicone remover
- Tar remover

### **Water leaks according to mileage or running time**

Increasing mileage has an effect on the problem of leaks in a vehicle. Possible influencing factors are:

- Servicing and maintenance of seals:
  - No maintenance, lack of maintenance or incorrect maintenance
  - Using an incorrect agent
- Damaged seals:
  - As a result of aging, wear or incorrect handling/assembly.
- Heavy soiling of the vehicle:
  - Heavy soiling of a vehicle can seriously impair the function of water drainage channels in particular, and also of rubber seals.
- Age-related factors:
  - Environmental factors
  - UV radiation
  - Extreme climatic conditions
- Corrosion can have a serious impact on bodywork, in particular as a result of:
  - Lightly or heavily rusted seal carriers
  - Rusted body seal welds
  - Perforation corrosion

### **Water leaks after body repairs**

If a vehicle develops a leak after body repairs, the following points must be taken into consideration in particular:

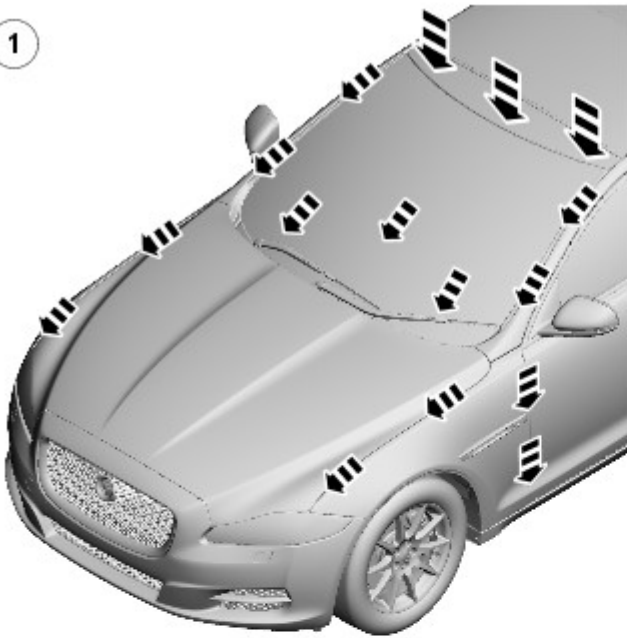
- The correct seating of ancillary components and their seals must be checked.
- The correct alignment of doors/tailgate and liftgate must be checked. The associated seals must not be damaged and must be installed correctly.
- Check that panel seams are correctly sealed.
- The correct seating of rubber grommets must be checked.
- Directly-glazed windows must have correct and complete bonding.

### **Water drainage system**

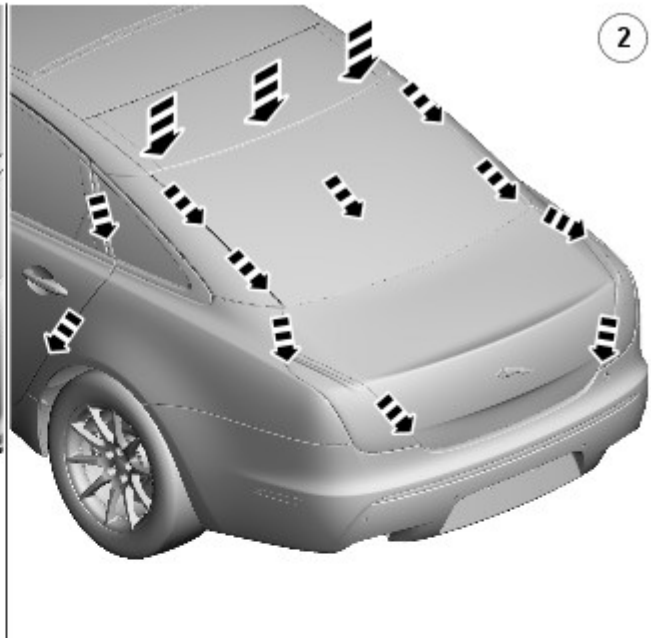
If a vehicle develops water leaks, then areas into which water is routed or drained should be checked first.

#### **Water drainage system (illustration for reference only)**

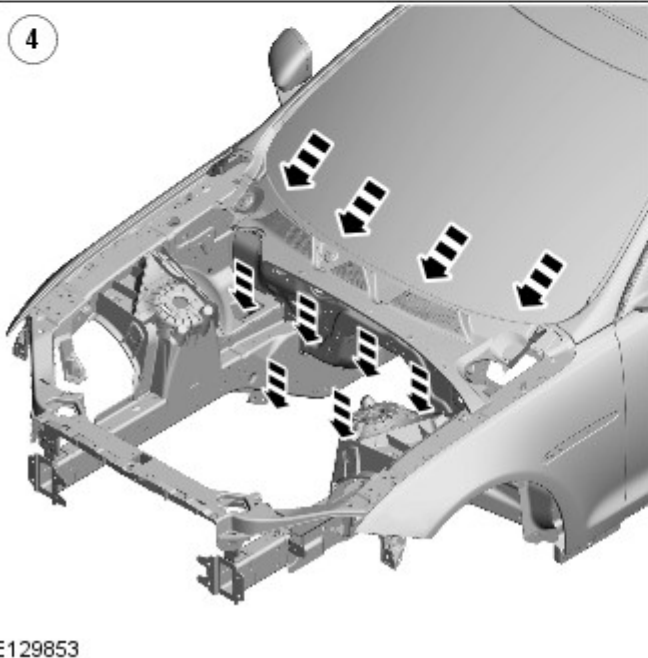
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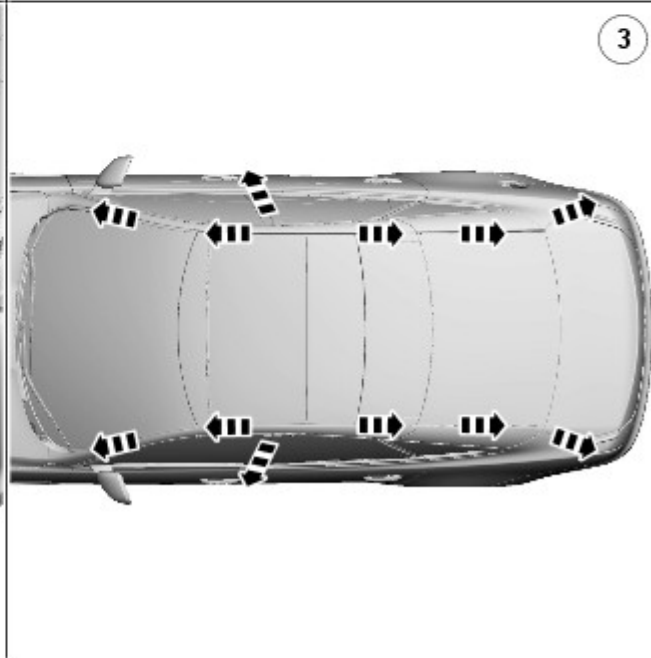
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Item	Description
1	Water drainage, front
2	Water drainage, side and rear
3	Roof drainage
4	Engine compartment drainage

### Water leaks, diagnosis and corrective action: Front passenger compartment

#### Windscreen

- Diagnosis:
  - Ingress of water into A-pillar area or instrument cluster area and rocker panel area.
- Cause:
  - Breaks in adhesive beads.
  - The breaks in adhesive beads can be located from inside by using compressed air. The leak can be identified from outside by the escaping air.
  - The second test method is by means of a water test. The outer trims must be raised carefully using a plastic wedge. The leak should be located from inside by a second assistant.
- Corrective action:
  - Remove the windscreen. Remove the existing adhesive bead and reapply using the correct bonding procedure.

#### Side windows

In the case of side windows, the same problems can arise as for a windscreen. The same corrective actions must therefore be used.

### Door seal

- Diagnosis:
  - Water ingress in the lower part of the interior door trim or in the rocker panel area.
- Cause:
  - The water shield fitted behind the interior door trim exists to drain off water that has entered the door via the drainage holes, either downwards or outwards. If the water shield seal is damaged or has been fitted incorrectly, then water can get into the passenger compartment.
  - In addition to this, the drainage holes can become clogged with leaves, dirt or excess cavity protection agents. Water gathers in the door and ingresses into the passenger compartment.
  - Check water shield for damage or correct fitting.
  - If the water shield needs to be re-bonded, then approved seam sealer should be used.
  - Before the water shield is installed, the drainage holes must be checked for unhindered flow.

### Door seals

- Diagnosis:
  - Ingress of water into the rocker panel area
- Cause:
  - Insufficient clamping load between seal and door.
- Corrective action:



**NOTE:** When adjusting the clamping load, the profile alignment of the relevant components must always be taken into consideration.



**NOTE:** Do not realign the flange too far in the direction of the door, as this can reduce the bearing surface of the seal to the door.

- Check clamping load:
  - The easiest way to check the clamping load of a seal to the respective bearing surface is by means of a paper strip test. This consists of trapping strips of paper at various points between the door and the seal, and fully closing the door. If it is possible to pull out the paper with no great resistance, then the clamping load is too low.
  - Adjust the clamping load:
    - The clamping load is normally adjusted using the striker. When doing so, the edge alignment from the door to the side panel, or from the front door to the rear door must be taken into account.
    - Another setting method is to realign the panel flange for the seal mounting. The clamping load is increased by moving the flange towards the door.
  - Check the bearing surface:
    - Apply chalk evenly to the surface of the seal. Evenly coat the bearing surface of the door with petroleum jelly.
    - Close the door fully, the lock must engage. Open the door. The imprint of the chalk (bearing surface) can be identified in the film of petroleum jelly.
    - The bearing surface should be at least 5mm across at all points.
- Other causes:
  - The door seal must completely seal the door where it meets the bodywork.
  - Water can ingress directly or indirectly into the interior of the vehicle if the seal is damaged at any point.
- Corrective action:
  - A damaged or worn door seal must always be installed in full.
  - When installing the seal, the following must be taken into account:
    - Always fit the seal first in the area of the narrow radii (corner points).
    - Next, secure the seal to the flange evenly by tapping lightly with a rubber hammer. The installed seal must not be kinked at any point.



**NOTE:** The prescribed length of a seal must not be shortened.

- Other cause:
  - The door seal is attached to the welded flange all the way round. If this welded flange is uneven or damaged at any point (usually in areas with small radii) then this point could be subject to leaks.
  - A stretched seal carrier can also cause a leak.
  - In both cases, water gets into the vehicle interior under the seal carrier.
- Corrective action:
  - Align the deformed welded flange using a hammer and anvil block, prevent and, if necessary, repair any paint damage.

### Roof opening panel - front and rear fixed glass panels

In the case of the roof opening panel - front and rear fixed glass panels, the same problems can arise as for a windscreen. The same corrective actions must therefore be used.

### Roof opening panel - sliding central glass panel



**NOTE:** In the case of the sliding central glass panel, the rubber seals and the lock actuator or latch mechanism must be checked first of all.

- Diagnosis:
  - Ingress of water at the roof opening panel.
- Cause:
  - The roof opening panel frame incorporates drain holes in each front corner allowing water to drain via the A-pillars and each rear corner allowing water to drain via the roof panel channels.
  - Damaged, worn, or incorrectly fitted seals on the sliding central glass panel.
  - Incorrect alignment of the sliding central glass panel.
  - Damaged, worn, or incorrectly fitted seals on the roof opening panel frame.
  - Water drain channels or water drain holes blocked.
- Corrective action:
  - Check the seals on the sliding central glass panel, install as necessary.
  - Check the correct adjustment of the sliding central glass panel, adjust as necessary, replace any worn or damaged components as necessary.
  - Check the internal seal of the roof opening panel frame, realign or install as necessary.
  - Check the water drain channels and holes for blockages, clear blockages as necessary.
  - Check the drainage system for unhindered flow.

#### **Luggage compartment lid**

- Diagnosis:
  - Ingress of water into the luggage area.
- Cause:
  - The leak problems of the luggage compartment lid correspond to those of the doors.
  - In addition to this, the area to be sealed is much bigger. The routing holes for cables and hoses must also be sealed.
  - The rubber grommets for the routing holes must be checked for damage and correct seating (fully unhooked).
  - The grommets around the luggage compartment lid hinges may leak.
- Corrective action:
  - Check the rubber grommets and re-position, reseal or install new, if necessary.

#### **Forced air extraction**

- Diagnosis:
  - Ingress of water into side luggage compartment area
- Cause:
  - The forced air extraction for the vehicle interior is located in the quarter panel lower extension.
  - The rubber flap of the forced air extraction must be able to move freely.
- Corrective action:
  - Remove the forced air extraction.
  - Check the seal area between the bodywork and housing, as well as the rubber flap.
  - Install a new seal if necessary.

#### **Rear window**

- Diagnosis:
  - Ingress of water into the passenger compartment area
- Cause:
  - Rear window leaking via breaks in the adhesive bead.
  - Check for leaks in the same way as for a leaking windscreen.
- Corrective action:
  - In the case of the rear window, the same problems can arise as for a windscreen. The same corrective actions must therefore be used.