



## Water Leaks

### 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 seals, and so on. Check water drain holes for unhindered flow.
  - 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 seals, 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
  - 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 rubber seal.

- Carry out the water test with a second person present (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).
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  - 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 grease. Slowly close the door and open it again. Check the width and continuity of the imprint on the door seal.
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  - Coat the bearing surface of the seal with a thin film of grease.

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### 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
  - 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
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  - Using an incorrect agent
- Damaged seals: As a result of aging, wear or incorrect handling/assembly.
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- 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.
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- Age-related factors: Environmental factors UV radiation Extreme climatic conditions
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  - 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
  - Lightly or heavily rusted seal carriers
  - Rusted body seal welds
  - Perforation corrosion

## Water leaks after body repairs

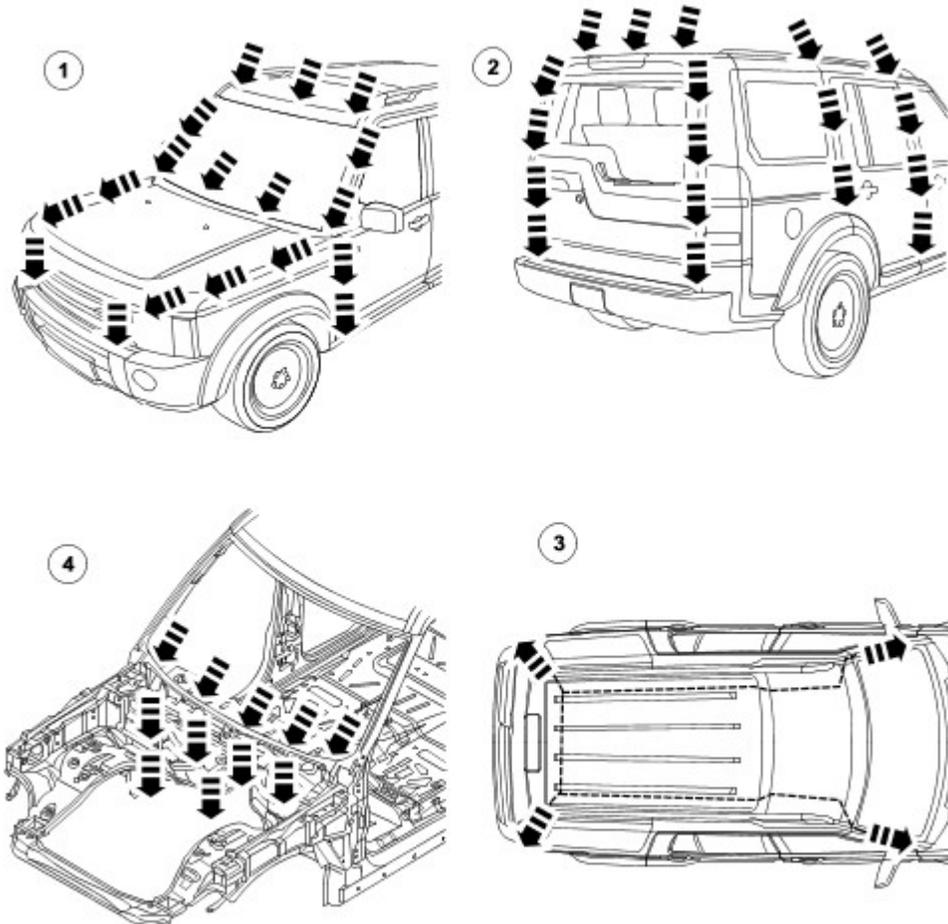
If a vehicle develops a leak after body repairs, the following points must be taken into consideration in particular:

- 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 welded 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



E56126

Item	Part Number	Description
1		Water drainage, front
2		Water drainage, side and rear
3		Roof drainage

4		Engine compartment drainage
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## 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.
  - Ingress of water into A-pillar area or instrument cluster area and rocker panel area.
- Cause: Breaks in adhesive beads
  - Breaks in adhesive beads
- Corrective action: 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.
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### 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.
  - 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.
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  - 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
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- Cause: Insufficient clamping load between seal and door.
  - Insufficient clamping load between seal and door.
- Corrective action: 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: **NOTE** :
  - When adjusting the clamping load, the profile alignment of the relevant components must always be taken into consideration.

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.

#### **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 the bearing surface: Apply chalk evenly to the surface of the seal. Evenly coat the bearing surface of the door with vaseline. 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 grease. The bearing surface should be at least 5mm across at all points.

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Check the bearing surface:

- Apply chalk evenly to the surface of the seal. Evenly coat the bearing surface of the door with vaseline.
  - 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 grease.
  - 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.
    - 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 renewed in full. When renewing 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.
    - A damaged or worn door seal must always be renewed in full.
    - When renewing 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 narrow 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.
  - 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 narrow 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.
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  - 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 narrow 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.

### Sliding roof/tilting roof

- Diagnosis: Ingress of water at sliding roof aperture
  - Ingress of water at sliding roof aperture
- Cause: The sliding roof/tilting roof is installed in a water trap. The water drains off via the water trap, water drain holes and drain hoses. The drain hoses lead downwards on both sides via the A-pillar and C-pillar. The drain holes or drain hoses can become clogged with leaves, dirt, underbody protection and so on.
  - The sliding roof/tilting roof is installed in a water trap. The water drains off via the water trap, water drain holes and drain hoses. The drain hoses lead downwards on both sides via the A-pillar and C-pillar.
  - The drain holes or drain hoses can become clogged with leaves, dirt, underbody protection and so on.
- Corrective action: **NOTE** :
  - In the case of a sliding or tilting roof, the external rubber seal and the lock actuator or latch mechanism must be checked first of all.

Check the water trap for leaks. Check the drain hoses for leaks and for correct connection to the water trap. Check the drainage system for unhindered flow, and blow out with compressed air if necessary. Check the external seal and the correct adjustment of the sliding roof.

- **NOTE** :
  - In the case of a sliding or tilting roof, the external rubber seal and the lock actuator or latch mechanism must be checked first of all.

Check the water trap for leaks.

- Check the drain hoses for leaks and for correct connection to the water trap.
- Check the drainage system for unhindered flow, and blow out with compressed air if necessary.
- Check the external seal and the correct adjustment of the sliding roof.

### Tailgate and Liftgate

- Diagnosis: Ingress of water into rear headlining area and luggage area.
  - Ingress of water into rear headlining area and luggage area.
- Cause: The leak problems of the tailgate and liftgate 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 mounting points of the tailgate and liftgate hinges may leak.
  - The leak problems of the tailgate and liftgate 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 mounting points of the tailgate and liftgate hinges may leak.
- Corrective action: Check the rubber grommets and renew if necessary. Check the hinge mounting points, and re-seal with sealing compound if necessary.
  - Check the rubber grommets and renew if necessary.
  - Check the hinge mounting points, and re-seal with sealing compound if necessary.

### Forced air extraction

- Diagnosis: Ingress of water into side luggage compartment area
  - Ingress of water into side luggage compartment area
- Cause: The forced air extraction for the vehicle interior is located in the D-pillar behind the rear lights. The rubber flap of the forced air extraction must be able to move freely.
  - The forced air extraction for the vehicle interior is located in the D-pillar behind the rear lights.
  - 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. Renew seal if necessary.
  - Remove the forced air extraction.
  - Check the seal area between the bodywork and housing, as well as the rubber flap.
  - Renew seal if necessary.

### Rear window and moon roof

- Diagnosis: Ingress of water into the luggage compartment area
  - Ingress of water into the luggage compartment area
- Cause: Rear window and moon roof leaking. Check for leak in the same way as for leaking windscreen.

- Rear window and moon roof leaking.
- Check for leak in the same way as for leaking windscreen.

#### **Panel connections with seal welds**

- Diagnosis: Ingress of water into the luggage compartment area
  - Ingress of water into the luggage compartment area
- Cause: Several panel connections must be fitted in production in the wheelhouse and luggage compartment areas. These connections are sealed with sealing compound. Uneven application of sealing compound can lead to a break in a seal weld.
  - Several panel connections must be fitted in production in the wheelhouse and luggage compartment areas. These connections are sealed with sealing compound.
  - Uneven application of sealing compound can lead to a break in a seal weld.
- Corrective action: Expose the seal weld. Locate the leak in the seal weld. Re-seal using sealing compound.
  - Expose the seal weld.
  - Locate the leak in the seal weld.
  - Re-seal using sealing compound.