

## SECTION : 501-25D Body Repairs — Water Leaks

VEHICLE APPLICATION : 2008.0 Falcon

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## DESCRIPTION AND OPERATION

### 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, 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
  - Test with UV lamp
  - Special mirror test
  - Chalk (powder) test
  - Flow tube (smoke) 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.
- The following are suitable for the water test:
  - softened water (liquid soap additive)

##### Automatic car wash

- 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

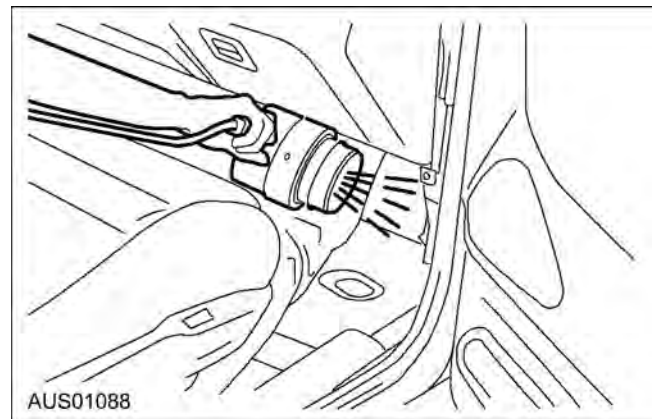
- If no leaks are located during the tests above, road tests should be carried out on wet roads.
- Road tests under various conditions:

- At various speeds.
- On various road surfaces.
- With loaded or unloaded vehicle.
- Driving through puddles (splash water).

#### Test with UV lamp

- Wet the test area with clear water from the outside.
- Prepare test liquid (see Owner's Handbook) and apply it from the outside using a suitable water sprayer.
- Illuminate the relevant area from the inside using the UV lamp.
- The test liquid will make the leak visible.

#### UV lamp



- Benefits of the UV lamp:
  - No need to dry out wet areas before the test.
  - The ingress of water and its subsequent path can be identified precisely.
  - No need to remove most ancillary components from the vehicle.

#### Mirror test

A mirror can be used to see into hard-to-reach areas.

##### Mirror

##### Benefits

- A switchable light built into the mirror area.
- The angle of inclination of the mirror can be set manually using the handle.
- The connector between the handle and the mirror is flexible.

#### Chalk test (Powder test)

- In this test, the clamping load and the bearing surface of the seal are checked.
- Performing the test:
  - Dust the sealing surface with chalk powder.
  - Slowly close the liftgate/door and open it again.



## DESCRIPTION AND OPERATION (Continued)

- Check the width and continuity of the chalk imprint to ensure the seal is operating effectively.

### Smoke test

- Test for locating leaks.
  - Set the interior ventilation to the maximum setting.
  - Use a smoke generator machine to create smoke in the test area (interior).
  - A second assistant locates points at which the smoke escapes on the outside.

### Other test equipment

- Other equipment such as stethoscopes 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
  - UV lamp
  - Stethoscope
  - Air flow checker
  - Ultrasonic measuring instrument

### 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 (ie. cleaner etc.)
- Damaged seals:
  - As a result of aging, wear or incorrect handling/assembly. (eg. door sag/damage)
- 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

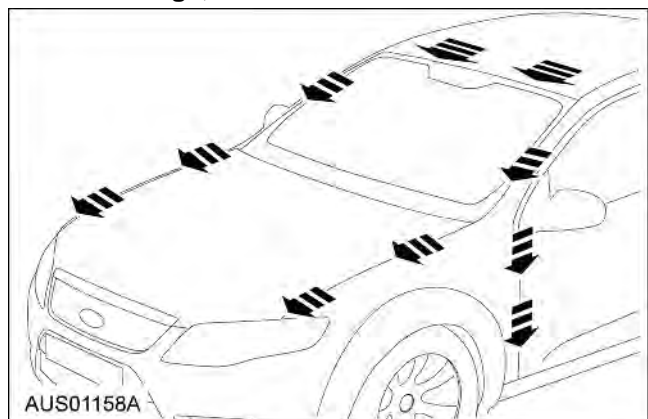
If a vehicle develops a leak after body repairs, the following points must be taken into consideration in particular:

- The correct seating of ancillary components and their seals (e.g. rear lamps, etc.) must be checked.
- The correct alignment of doors and luggage compartment lids/tailgates 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.
- The windows must be installed precisely and the sealer must make contact with the body all the way round.
- Seals are fitted correctly as per PCP.

### Water drainage system

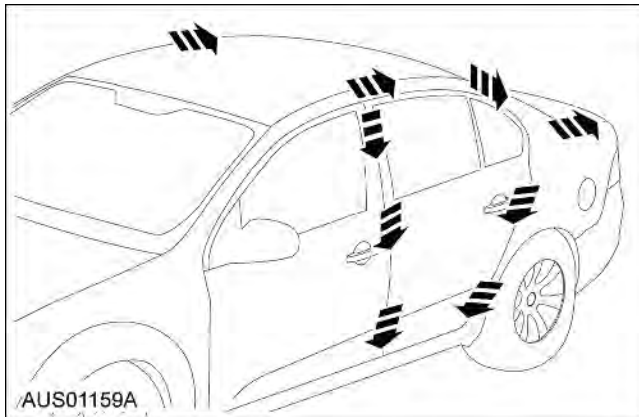
If a vehicle develops water leaks, then areas into which water is routed or drained should be checked first. (eg. sunroof)

#### Water drainage, front

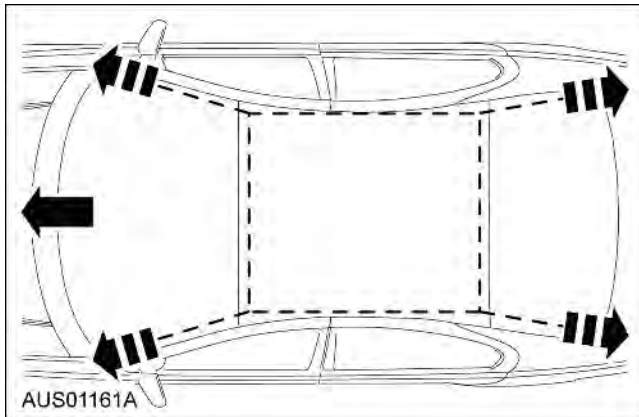


## DESCRIPTION AND OPERATION (Continued)

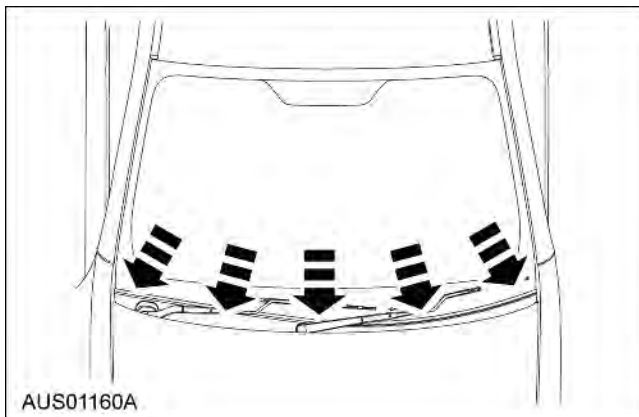
### Water drainage, side and rear



### Sliding roof drainage



### Drainage water tank



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

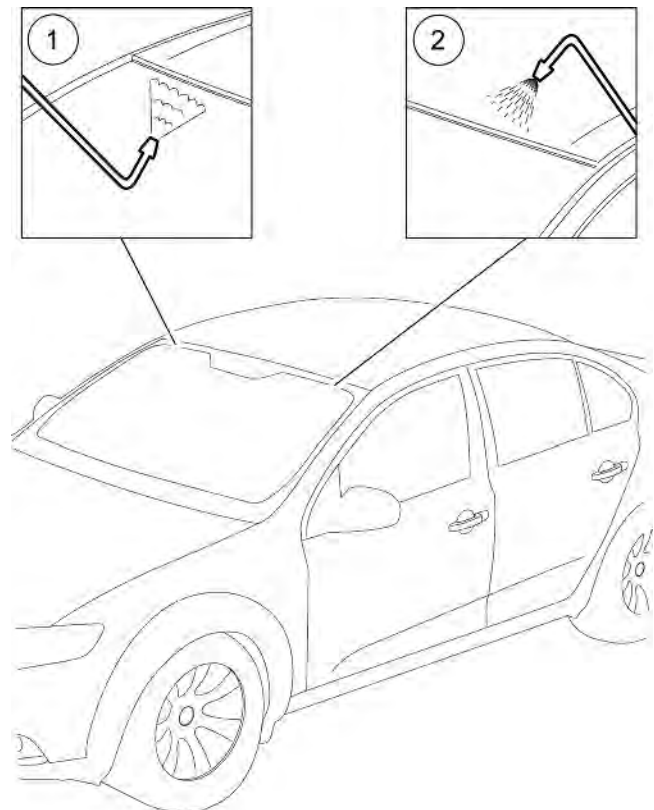
#### Windscreens

**NOTE:** The repair must be carried out in line with approved methods.

**NOTE:** In both air/water tests the roof rail weather/stripe must be removed first.

- **Diagnosis:**
  - Ingress of water into A-pillar area or instrument cluster area
- **Cause:**
  - Breaks in adhesive beads
- **Corrective action:**
  - Breaks in adhesive beads can be located from inside by using compressed air. The leak can be identified from outside by the escaping air.
  - A second test method is by means of a water test.

### Diagnosis of a water leak



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Item	Description
1	Compressed air test
2	Water test

### Side windows

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

### Door seal

**NOTE:** If a foam watershield becomes damaged in any way, then it must always be renewed.

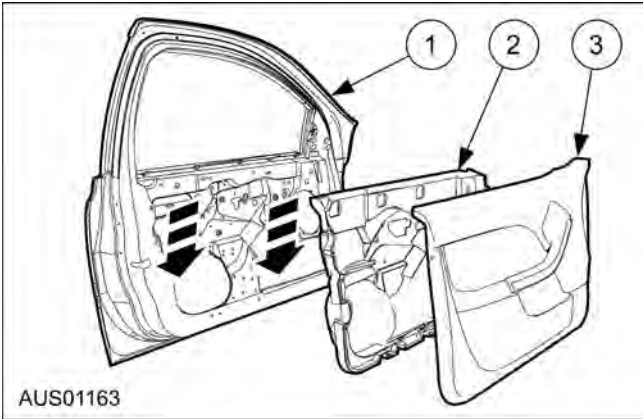


DESCRIPTION AND OPERATION (Continued)

- Diagnosis:
  - Water ingress in the lower part of the interior door trim or in the rocker panel area.
- Cause:
  - The foam watershield 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 foam watershield 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 foam watershield for damage or correct fitting.

- Check clamping load: Refer to Chalk Test.
- 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 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.

Door seal



Item	Description
1	Door sheetmetal
2	Foam watershield
3	Interior door trim

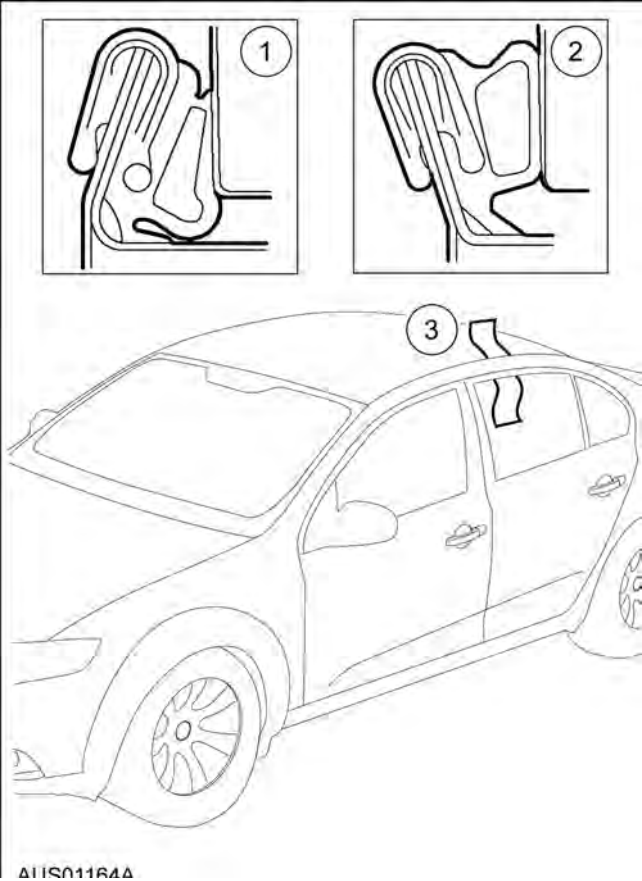
Door seals

**NOTE:** When adjusting the clamping load, the edge 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.

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

Checking the seal



Item	Description
1	Panel flange bent too far inwards: small bearing surface



## DESCRIPTION AND OPERATION (Continued)

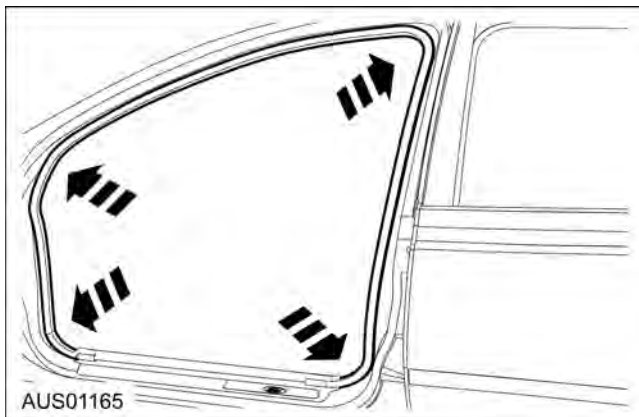
Item	Description
2	Panel flange adjusted correctly: correct bearing surface
3	Check clamping load with a strip of paper

- 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 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.

### Correct installation of the door seal

**NOTE:** If the seal has a connecting joint, this must always be at the bottom of the door surround.



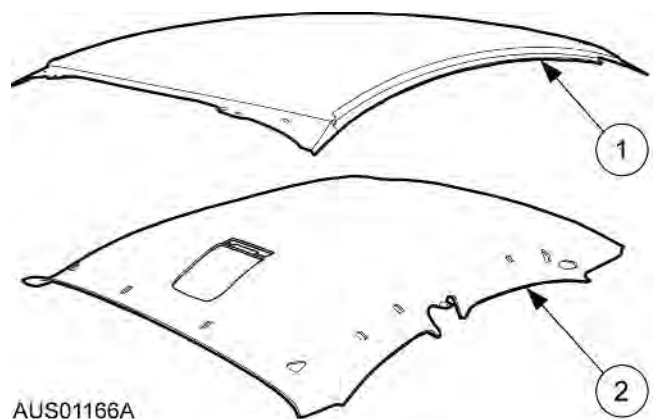
- Other cause:
  - The door seal is attached to the welded flange all the way round. If this welded flange is uneven or damaged at any point (usually in areas with narrow radii) then this point could be subject to leaks.
  - A stretched seal carrier can also cause a leak.
  - In both cases, water gets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

- A stretched seal carrier must be realigned by hand. If this is no longer possible, the seal must be renewed.

### Sliding roof/tilting 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.

- Diagnosis:
  - 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.
- Corrective action:
  - 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.



Item	Description
1	Roof sheetmetal
2	Headliner

### Apron panel and heating/ventilation

- Diagnosis:
  - Ingress of water into the front footwell area
- Cause:
  - The apron panel is sealed in several places to adjacent components, such as at the joints to the A-pillar or to the floor pan. These seals can be broken.

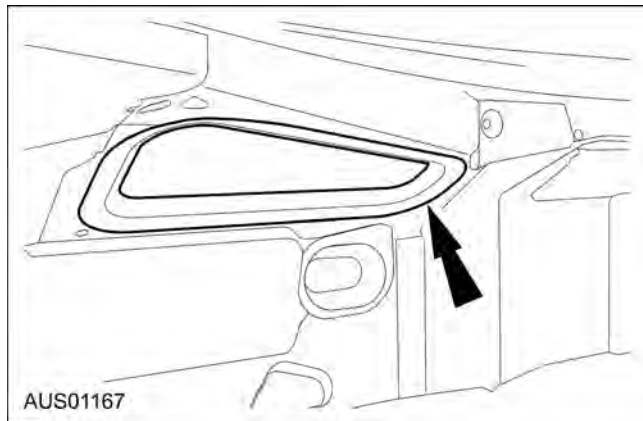


## DESCRIPTION AND OPERATION (Continued)

- The heater and ventilation housing is attached to the apron panel. The pass through area is sealed with a foam watershield that is fixed to the housing.
- The housing has drain holes to allow the water to drain off.
- If the foam watershield is defective or the drain hole is clogged, water can ingress into the front footwell area.

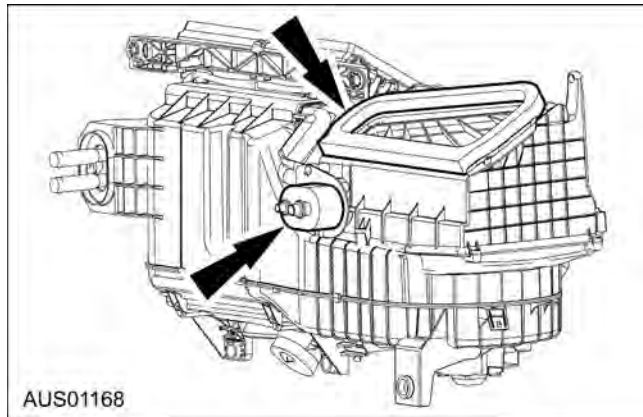
### Heater and ventilation housing seal

**NOTE:** Damaged foam watershield must always be renewed.



- Corrective action:
  - Seal the broken seal welds.
  - If a leak is found in the heater or ventilation housing, the drain holes must be checked first.
  - The housing may have to be removed to check the foam watershield and its bearing surface for damage.

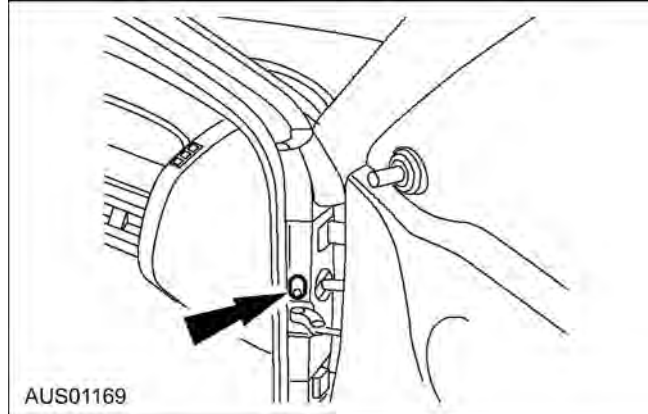
### Checking foam watershields and water drain holes



- Other causes:
  - Fastening bolts and routing holes for cables and hoses must be checked for leaks in the area of the apron panel and instrument cluster (rubber grommets in particular).

- If the footwell area is wet, then the door hinge seal, the door light switch and cable routing holes must also be checked.

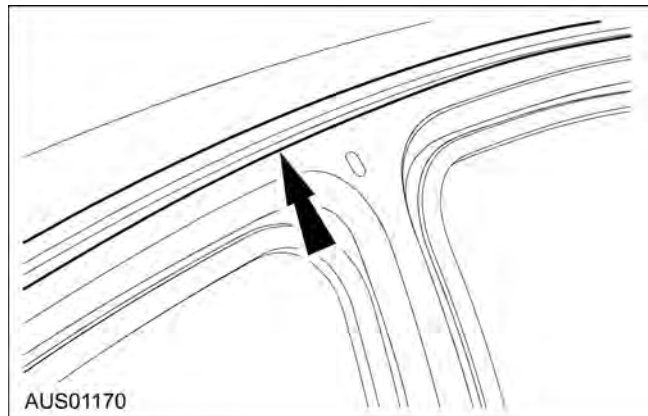
### Door light switch seal



### Rear drip rail seal

- Diagnosis:
  - Ingress of water into side headlining area
- Cause:
  - The roof outer panel is sealed with a seal weld at the connection point to the side panel. This seal weld can be concealed with a bezel or trim strip.
  - In the case of estate and hatchback vehicles, there is an additional seal to the rear roof crossmember.
  - Water can enter here if there is a break in the seal weld.
- Corrective action:
  - Remove trim strip or bezel. Check and re-seal the seal weld.

### Drip rail seal



### Luggage compartment seal

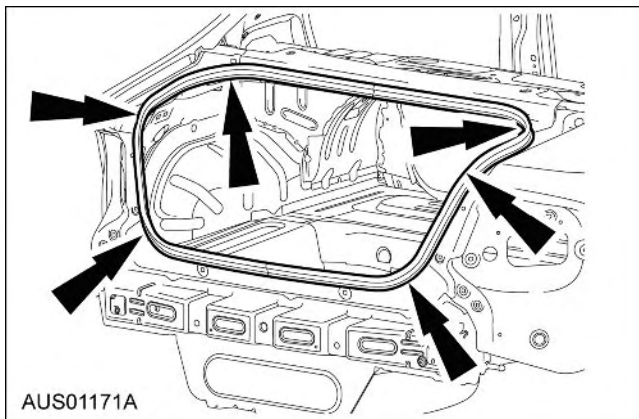
- Diagnosis:
  - Ingress of water into the luggage compartment



## DESCRIPTION AND OPERATION (Continued)

- Cause:
  - The luggage compartment lid seal corresponds to the door seal.
  - If there is a water leak, the seal must be checked for damage and the seal carrier must be checked for correct seating.
  - The clamping load and the bearing surface of the lid must also be checked for leaks.
- Corrective action:
  - The adjustment of the lid is made using the lock striker or the lock.
  - Rubber bump stops are attached to both sides of the luggage compartment opening. These are normally adjustable, and the clamping load can be modified.
  - The narrow radii of the luggage compartment lid seal are also problem areas.

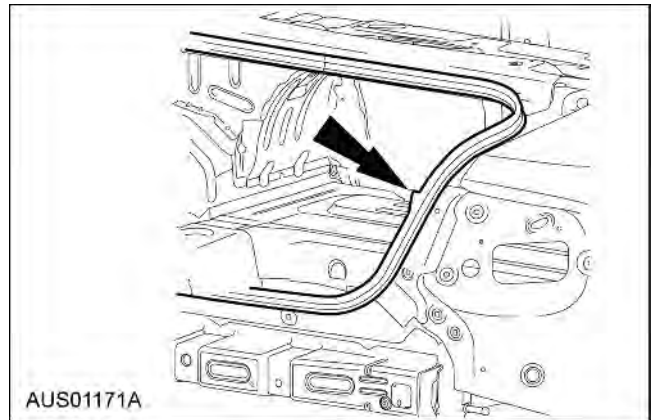
### Check the seal for correct installation position



- Other cause:
  - The seal is not attached evenly around the lid because of a deformed or uneven welded flange.
- Corrective action:
  - Check the seal and bearing surface.
  - Re-align a deformed or uneven welded flange.

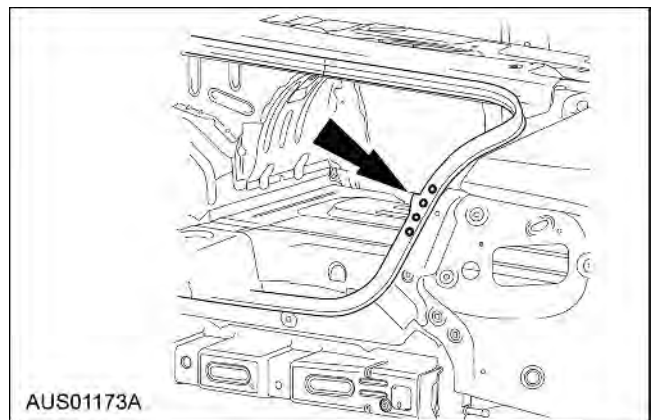
### Uneven welded flange.

**NOTE:** The seal carrier covers a defective weld.



- Other cause:
  - Leaking weld on welded flange (melted through). Water can ingress into the luggage compartment under the seal carrier.
- Corrective action:
  - Pull the seal from the seal carrier.
  - Seal the leaking weld using sealing compound.

### Welds melted through



### Forced air extraction

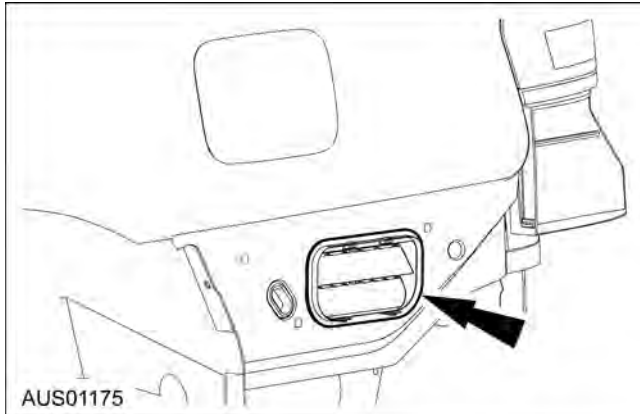
- Diagnosis:
  - Ingress of water into side luggage compartment area
- Cause:
  - The forced air extraction for the vehicle interior is located in the lower side panel area of the luggage compartment. The ventilation housing is sealed with a rubber watershield on the bodywork side.
  - The rubber flap of the forced air extraction must be able to move freely and not be warped.





**DESCRIPTION AND OPERATION (Continued)**

- Corrective action:
  - Remove the forced air extraction. Detach the bumper if required.
  - Check the seal area between the bodywork and housing, as well as the rubber flap.
  - If rubber flaps are warped, reposition by lifting/fixing.
  - Replace damaged air extractor as necessary.

**Check the seal for the forced air extraction.****Rear window**

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

