

Unit 209: Drainage systems

Outcome 3

**The procedures for soundness
testing and commissioning
above ground systems**

Soundness testing

The soundness test and commissioning procedure for sanitary pipework is the final part of the installation.

When testing the pipework the plumber is looking at two elements:

- Soundness – no leaks
- Performance – as per BS EN 12056

Soundness testing

The first important inspection is the **visual** inspection.

- All parts connected
- Clipping distances as per BS EN 12056
- Gradients at correct angle
- Gradients in correct direction

If the system is large, or in a multi-storey building, the system will need to be tested in stages.

Likewise, if pipework is below floor level, the pipework will need to be tested before the floor is put down.

Soundness testing

Soundness test

1. Plug the top and bottom of the test area, using a drain plug or inflatable drain bag.

The system can be plugged at the top of the stack and at any access point.



Soundness testing

Soundness test

2. Fill all the appliance traps with water, allowing a small amount of water to enter the pipework and therefore cover the bottom plug.

The water covering the bottom plug will ensure the plug is airtight. The water in the traps will ensure that no air can escape through the appliance.

Soundness testing

Soundness test

3. Attach one of the three rubber tubes to the test nipple on the top plug. Attach the tee piece to the other end of this first rubber tube. Then attach the other two lengths of rubber tube to the tee piece, which in turn connects to the pump and manometer.



Soundness testing

Soundness test

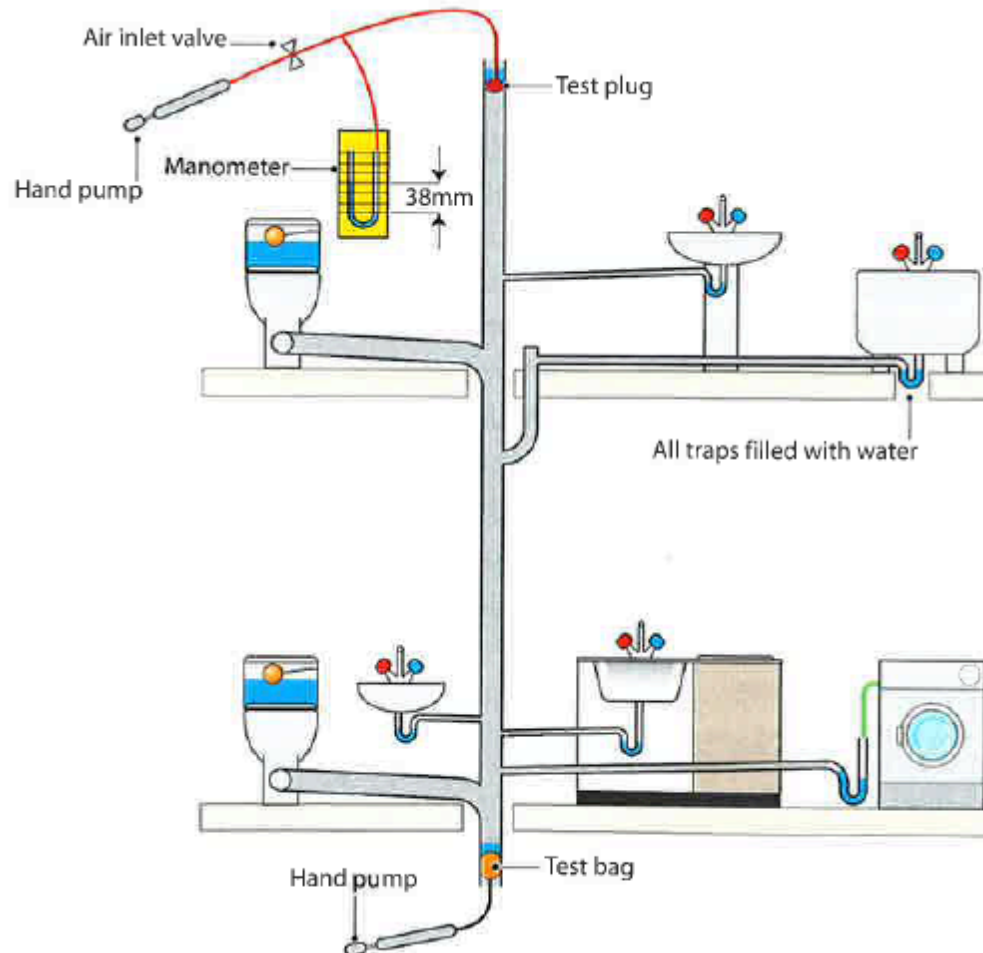
4. Gently squeeze the pump until the manometer measure is 38mm. At that point, turn the inlet valve off so no air can escape through the pump.

The 38mm test pressure should remain for three minutes, with no drop in pressure.

If there is a drop in pressure, the leak needs to be found and the system re-tested.

Soundness testing

Soundness test



Soundness testing

Soundness test

To trace a potential leak, soapy water will need to be sprayed on all joints while the system is under pressure. The leak is found when bubbles are seen. The leak will need to be rectified then the system re-tested.

38mm is the maximum pressure the system can be put under due to some appliances only having a 50mm trap seal.

Soundness testing

This test is a statutory requirement under Building Regulations H.

H1 SANITARY PIPEWORK

Workmanship

1.37 Good workmanship is essential. Workmanship should be in accordance with BS 8000 *Workmanship on Building Sites* Part 13: *Code of practice for above ground drainage*.

Air tightness

1.38 The pipes, fittings and joints should be capable of withstanding an air test of positive pressure of at least 38mm water gauge for at least 3 minutes. Every trap should maintain a water seal of at least 25mm. Smoke testing may be used to identify defects where a water test has failed. Smoke testing is not recommended for PVC-U pipes.

Alternative approach

1.39 The requirement can also be met by following the relevant recommendations of BS EN 12056 *Gravity drainage systems inside buildings*. Relevant clauses are in Part 1: *General and performance requirements*

Soundness testing

NG.3.1 Air test

NOTE Normally this test is carried out to confirm that all pipes and fittings are airtight. It should be completed in one operation but for large multi-storey systems testing in sections may be necessary.

NG.3.1.1 Preparation

The water seals of sanitary appliances should be fully charged and test plugs or bags inserted into the open ends of the pipework to be tested. To ensure that there is a satisfactory air seal at the base of the stack, or at the lowest plug or bag in the stack if only a section of the pipework is to be tested, a small quantity of water sufficient to cover the plug or bag can be allowed to enter the system.

One of the remaining test plugs should be fitted with a tee piece, with a cock on each branch, and one branch being connected by means of a flexible tube to a manometer. Alternatively, a flexible tube from a tee piece fitted with cocks on its other two branches can be passed through the water seal of a sanitary appliance. Any water trapped in this tube should be removed and then a manometer can be connected to one of the branches.

NG.3.1.2 Application

Air is pumped into the system through the other branch of the tee piece until a pressure equal to 38 mm water gauge is obtained. The air inlet cock is then closed and pressure in the system should remain constant for a period of not less than 3 min.

Soundness testing

Soundness test

There are two other soundness tests not commonly used.

1. Smoke test: when a smoke pellet is lit inside the system and the pipework fills with smoke and you look for a leak of smoke. This can only be used on cast iron stacks due to the heat of the pellet and the reaction of the smoke.
2. Hydraulic test: where a section of the system is filled with water and you look for a leak of water.

Soundness testing

Soundness test

Now the system has been proved to be sound, the plumber can move onto the next important test:

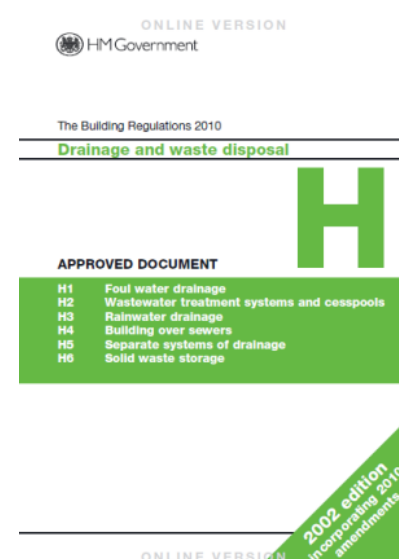
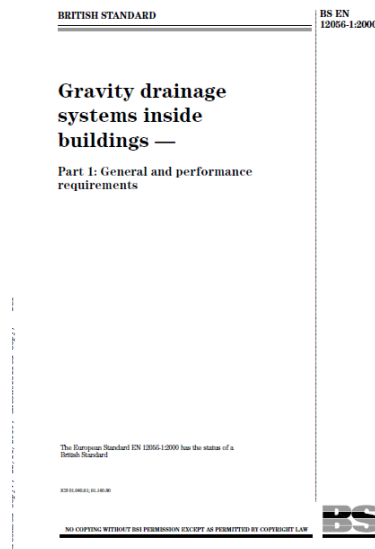
The performance test

Soundness testing

Performance test

All the soundness test equipment is removed and the system is now ready for the performance test.

This has to be completed to ensure the system meets the recommendations in BS EN 12056 and Building Regulations part H.



Soundness testing

Performance test

- 1.Fill all the appliances on the system to their overflow levels.
- 2.Release the water from all the appliances simultaneously.
- 3.Flush the WCs at the same time
- 4.Once all the appliances have finished discharging, check the trap seal depth in each appliance.

Soundness testing

NG.3.2 Performance tests

NG.3.2.1 General

All appliances, whether discharged singly or in groups, should drain speedily, quietly and completely.

To ensure that adequate water seals are retained during peak working conditions, the tests described in NG.3.2.2 should be carried out. After each test a minimum of 25 mm of water seal should be retained in every trap. Each test should be repeated at least three times, the trap or traps being recharged before each test. The maximum loss of seal in any one test, measured by a dip stick or small diameter transparent tube, should be taken as the significant result.

NG.3.2.2 Tests for self-siphonage and induced siphonage in branch discharge pipes

To test for the effect of self-siphonage the appliance should be filled to overflowing level and discharged by removing the plug; WC pans should be flushed. The seal remaining in the trap should be measured when the discharge has finished. Ranges of appliances, connected to a common discharge pipe, should also be tested for induced siphonage in a similar way. The number of appliances that should be discharged together is given in Table NG.1. The seal remaining in all the traps should be measured at the end of the discharge. The worst conditions usually occur when the appliances at the upstream end of the discharge pipe are discharged.

Soundness testing

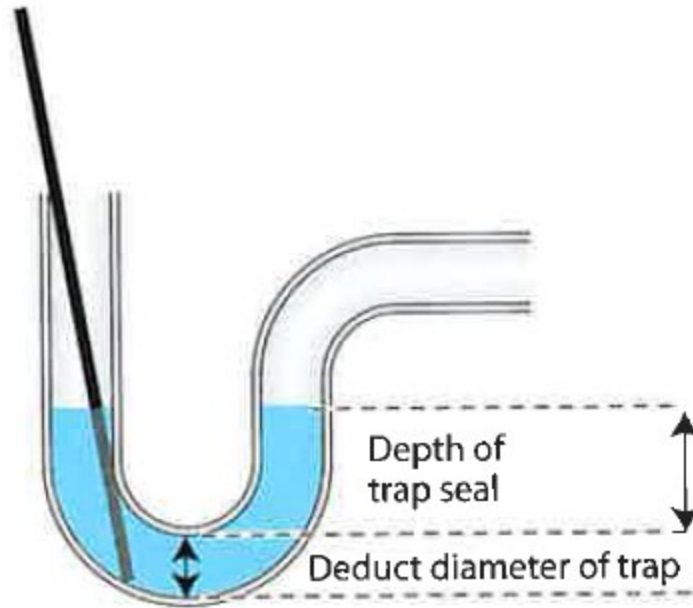
Performance test

Check the trap seal depth:

- The trap seal depth after all the appliances have been discharged **must** be a minimum of 25mm deep in each trap
- The depth of each seal is checked by the use of a matt black dipstick. This is pushed down in between the waste grill, down to the bottom of the trap

Soundness testing

Performance test



This test is carried out three times.

Common faults

With any system, periodic or regular maintenance is essential to ensure problem-free use.

This is particularly important if the system is older. Materials like cast iron corrodes over time, which can cause leaks and cracks to appear. Materials like asbestos will cause health and safety issues if damaged or disturbed.

On larger commercial systems, planned preventative maintenance (PPM) schedules are very important. These list the property and all items to be inspected.

Common faults

Cleaning traps

Bath and shower traps readily block with hair and soap residue. This will lead to slower discharges, smells and possible blockages.

The kitchen sink trap will start to collect grease, which sticks to the side of the pipes. This restricts the discharge from the sink and increases the chance of blockages.

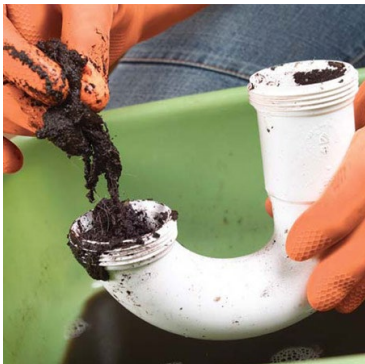
Common faults



The grill on a shower trap can be removed and cleaned.



The trap from under a bath can be removed, if necessary, although this is quite rare.



The trap under a sink should be removed periodically and any build up thoroughly cleaned.

Common faults

Cleaning chemicals may be used in certain circumstances but the full COSHH data sheet **must** be followed. Correct PPE should be worn and the room ventilated, if required.

- Chemicals can burn skin
- Chemicals can have dangerous fumes
- PPE such as rubber gloves and eye protection may be required
- **Never** mix different chemicals as this could cause dangerous fumes



Common faults

Plungers or force cups can be used to release small blockages. These use the power of the build-up of positive pressure to push a blockage down the pipe.

When using these the overflow and any other connected appliance will need to be covered before use.



Common faults

Hand or drill augers are a useful tool to release a blockage in a waste pipe. These comprise of a rotating spring that spins in the pipe, breaking up any debris.

The trap may have to be removed first so the spring can be pushed down the waste pipe.



Common faults

Cleaning overflows is another important and often forgotten job. These start to block as a result of their connection to the trap area. They need disconnecting and flushing through.

Belfast sink overflows are notorious for blocking. As these are porcelain they can be cleaned with a stiff brush.



Common faults

Checking access covers is an important PPM activity. The lubrication of the nuts and bolts securing the access cap with silicon grease can save a lot of time in an emergency.

If the access cap is a screwed cap, the internal thread can still be lubricated.

Inspect the rubber seal for any sign of damage or aging, as this creates an important watertight seal.

Common faults

Check the pipework (that is visible) for any leaks, missing/damaged clips or sagging. External soil pipes can age and corrode so good maintenance is essential.

Any damage should be reported to the customer and rectified.

Check that the domical cage or cowl is still in position and hasn't been blown off in high winds.

Common faults

When an unexpected maintenance activity needs to take place on a system always:

1. Check with your supervisor.
2. Check with the customer.

Common faults

Unblocking drains or soil stacks is probably one of the most unpleasant jobs a plumber will undertake. As previously outlined, this can pose real health risks.

- Keep up-to-date with jabs
- Wear rubber gauntlets
- Wear eye protection
- Wear face mask
- Wear boiler suit
- Wear wellington boots

Common faults

There are numerous reasons why drains and soil pipes can get blocked:

- Physical blockage
- Broken drain
- Tree roots

Common faults

Physical blockage can be caused by a build-up of debris over time, or it could be caused by an incorrect item entering the system and becoming wedged.

The build-up of grease and food items is a common cause of blockage but items like nappies can also cause problems.



Common faults

Broken drains generally occur on older or incorrectly installed drains. Drains collapse, allowing the substructure to fill the drain.

Age, vehicle movement, ground movement and incorrect installation can cause this to happen. There is little a plumber can do – a specialist needs to be called in, who will use an inspection camera to accurately assess the situation.



Common faults

Tree roots can block a drain over a period of time. They can grow in between the joints of a clay drain, attracted by the moisture.

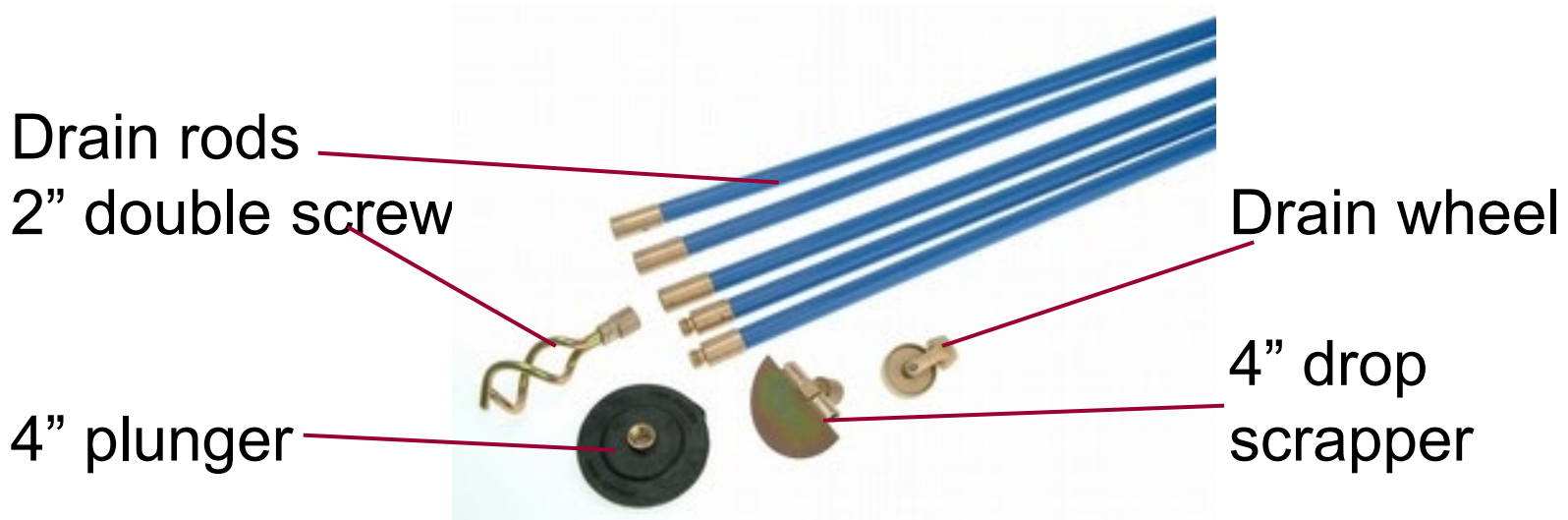
If roots are caught early they can be broken off but if a major blockage is found, specialists with inspection cameras will be required.



Common faults

The symptoms of a blockage can be a slow discharge from an appliance or the back-filling of the waste pipe system.

The correct use of drain rods and attachments for underground blockages is important.



Common faults

Drain rods

Always continue to rotate them clockwise otherwise they can undo in situ.

Additional lengths can be added, as required.

The double screw allows the engineer to rotate the rods, engaging the screws into the blockage and pulling back some of the debris.



Common faults

Drain rods

The plunger acts like the force cup, creating positive and negative pressure in the pipe, aiming to release a minor blockage.



The drop scraper is pushed over part of the blockage and can drag back some debris.



Common faults

Drain rods

The drain rod wheel is often the first tool to be used. When the manhole covers – upstream and downstream – are lifted, the wheel is attached to the drain rods and pushed upstream to locate the blockage.



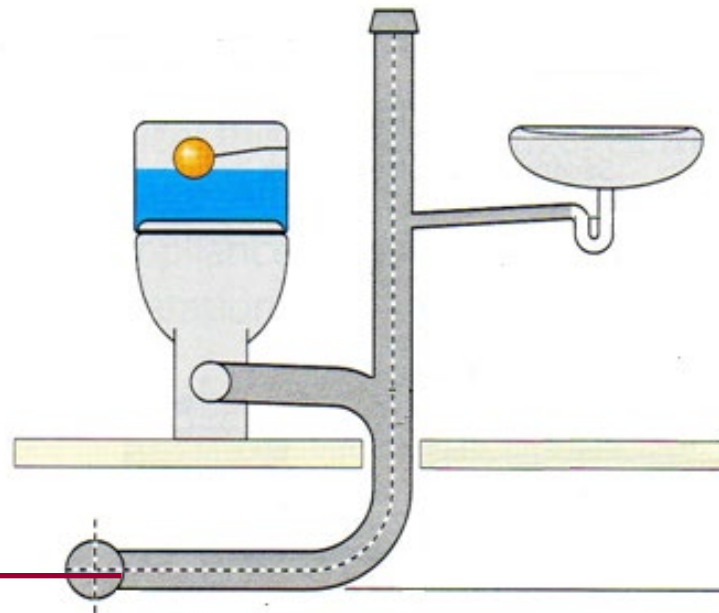
Common faults

After a blockage is physically cleared, the pipework may need to be pressure sprayed to clear the remaining debris. Again, this is generally a specialist job. The water is pressurised and then discharged in the reverse direction, drawing any debris back to the operator.



Common faults

If a WC is connected to the surface water drain in a separate/partially separate system, the customer will need to be notified immediately so it can be reconnected to the foul water sewer.



Surface water sewer

Common faults

Whenever working on soil stacks or drains:

- Wear the correct PPE
- Inform the customer of any inconvenience
- Ask the customer **not** to use appliances
- Place warning notices on appliances – **work in progress not in use**
- Place warning notices around the working area
- If lifting a manhole cover, secure the area
- If working on the upper level of a soil stack, it is only appliances on or above the working level that need to be labeled
- Use the correct access equipment

Decommissioning

When a plumber removes old sanitary appliances and may have to replace them with new ones, the plumber is decommissioning the above ground drainage system.

This may include waste pipes, discharge branches and even the soil stack and vent pipe.

These procedures need careful planning.

Decommissioning

Temporary decommissioning

A soil stack or section of soil stack may be taken out of service for a short period of time whilst work is carried out. A new connection might be made or an appliance replaced and the customer informed.

Permanent decommissioning

A soil stack is taken out of service and possibly dismantled, securing the drain entrance.

Decommissioning

Removing old appliances

Risk assessments must be carried out prior to any work starting.

The correct PPE will need to be worn to protect yourself against any effluent on appliances or in pipework.

Cast iron soil stacks are heavy and the correct access equipment will be required. These too may need to be broken into pieces for safe removal.

Decommissioning

Removing old appliances

Cast iron baths are heavy and may need a team lift, or to be broken into pieces for removal. To break the bath you will need to wear ear defenders, gloves and eye protection. A club hammer is used to break it into pieces. (Don't forget there is value in a secondhand cast iron bath.)

When removing any vitreous china appliance, care must be taken not to damage it and therefore form sharp edges.

Decommissioning

Removing old appliances

For asbestos soil and vent pipes, advice will need to be sought from your supervisor. On no account should you break these up, releasing dangerous fibres into the atmosphere. This may need to be removed by specialist contractors.

If lead waste pipes are found, care needs to be taken on two accounts: lead is heavy and lead is poisonous. Take special care if the lead is covered in white powder (lead oxide) as, once airborne, this can be ingested. Lead also has a good scrap value and should be recycled.

Decommissioning

General points

- If working at heights use barriers and warning signs
- If temporarily decommissioning, avoid accidental use of appliances
- Always inform the customer
- Ask for advice from your supervisor
- Follow the risk assessment
- Wear the correct PPE