Drain Tests

As part of the verification procedure drain tests are to be witnessed, both for open i.e. first and final.

The surveyor is to make a judgement for the first test based on location, type of project, contractor and the surveyor's workload. If the surveyor allocated cannot accommodate the request for the test he will check on the availability of the other surveyors in the office.

If the request cannot be undertaken, the surveyor is to advise the contractor to take pictures of the drain showing it half barrel in pea gravel, the bottoms of the stacks, and lintels as it passes through the building.

Externally an indication of the depth, line and junctions will be required.

The surveyor is to advise the contractor to test and back fill, he is also to suggest the contractor to re-test once the column is backfilled and prior to the column concrete being poured, to check that the drains have not been damaged at this stage.

A final drain test is required for all new work. This is to be undertaken at the completion stage, guidance is attached in the following appendix.

The drains must stand, if there is any drop this is to be within the British Standards limits. If the drain fails the surveyor is to use his discretion on how long he will stay on the site awaiting a satisfactory test.

If the reason for failing cannot be resolved within a reasonable time the surveyor is to advise the contractor and arrange for a mutually convenient time for his return. The surveyor is not bound to return the next day and will advise the contractor accordingly.

The following are typical guidelines:

Air or Water Test

Operation - Testing drain plugs should be placed in the open ends (and branches) of the section of pipeline to be tested and tightened within the bore of the pipe, to effect an airtight seal. Where possible, the inside of the pipe should be cleaned before fitting the drain plugs, to ensure no grit or other detritus is present that could impair the air-tight seal required for an effective test.

One drain plug, normally at the head of the run, is fitted with the nipple that connects to the flexible hose, which in turn, is connected to the manometer, which has been partially filled with water equal to the 0mm level. Air is pumped into the pipeline, via the hand-pump, until the reading on the manometer is around 120mm.

The set-up is left for 5 -10 minutes to allow for temperature stabilisation within the pipe, then the pressure is reduced (via the control valve) to exactly 100mm on the manometer scale. The manometer is then monitored for a period of five minutes; the level of water in the manometer should not fall below the 75mm mark during this period. This is deemed to 'pass' and the pipeline is declared satisfactory.

However, if the level in the manometer does fall below the 75mm mark, then the equipment should be checked and cleaned and the pipeline examined for leaks or defects. If any problems are identified, they should be rectified before re-testing. If the air test is re-applied and is failed for a second time, a water test should be administered.

Air or Water Test

An air test is considered more sensitive than a water test. Failure of an air test may even be caused by temperature fluctuation within the pipeline. For example, in an uncovered pipeline (occasionally shaded by passing clouds on a sunny day) a drop in temperature of just 1°C within the pipe may be enough to cause a drop in pressure large enough for the test to fail.

Failure to pass the air test shall not preclude satisfactory testing, if a water test can subsequently be carried out successfully. It is not impossible for a pipeline that has

failed an air test to pass a water test

Water Test

In a water test the lower end of the pipeline is sealed using a drain plug and the section under test is filled with water. A head of water is created, following a period of settlement and acclimatisation, the level of water in the head is monitored for a specified period and the loss of water measured and checked.

The size of pipe being tested will determine the actual test parameters. Pipes of 300mm diameter or less typically follow the requirements of BS8301 (1.5m head at high end; max 4m head at lower end) while larger diameter pipes (>=400mm) follow BS8005 (1.2m head at high end; max 6m head at lower end). Where a pipeline would generate a head greater than that specified, it should be tested in stages, to reduce the maximum head, and minimise the risk of damage to the pipeline.

Water Test Procedure Water should be added to the pipeline (via a hose) up to the required head level in the vertical pipe and the pipeline visually inspected for leaks. After filling, water should be left to stand for at least 120 minutes, to allow for displacement of trapped air and any absorption by the pipe, before being topped up to exactly the required level.

The set-up is then monitored for a period of thirty minutes, during which the water level of the head is topped-up as required at regular intervals and the quantity of water added is recorded. After thirty minutes, the total quantity of water added to the vertical pipe during the monitoring period is calculated and should be less than 0.5 litres per lin.m per 1.0 metre of nominal diameter; (e.g. 0.05l per lin.m in a 100mm dia. pipe).

If leakage is more than the maximum permissible addition then the pipe has failed the water test. Further investigation is necessary to determine the cause of the fault.

Appendix
Extract from BS EN 12056-:2000
NG.3 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.

NG.3.1.3 Leak location

NOTE: Defects revealed by an air test may be located by the methods given in NG.3.1.3.1, NG.3.1.3.2 and NG.3.1.3.3.

NG.3.1.3.1 Smoke

A smoke producing machine may be used which will introduce smoke under any pressure into the defective pipework. Leakage may be observed as the smoke escapes. Smoke cartridges containing special chemicals should be used with caution, taking care that the ignited cartridge is not in direct contact with the pipework and that the products of combustion do not have a harmful effect upon the materials used for the discharge pipe system.

Smoke testing of plastics pipework should be avoided due to naphtha having a detrimental effect, particularly on ABS, PVC-U and MUPVC. Rubber jointing components can also be adversely affected.

NG.3.1.3.2 Soap solution

With the pipework subject to an internal pressure using the smoke machine method as described in NG.3.1.3.1, a soap solution can be applied to the pipes

and joints. Leakage can be detected by the formation of bubbles.

NG.3.1.3.3 Water Test

There is no justification for a water test to be applied to the whole of the plumbing system. The part of the system mainly at risk is that below the lowest sanitary appliance, and this may be tested by inserting a test plug in the lower end of the pipe and filling the pipe with water up to the flood level of the lowest sanitary appliance, provided that the static head does not exceed 6 m.

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 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.