

A practical guide for site personnel

Site sampling and testing of concrete



Cubes have a vital role to test that the concrete strength meets the specification requirement. However, the cube results will be meaningless unless the sampling and testing procedures given here are followed.

Sampling

The standard composite sample BS EN 12350-1

To ensure it is representative of the whole truck load a standard sample consists of scoopfuls taken from four different parts of the load and collected in buckets.

Scoopfuls must be taken through the moving stream, as the load is discharged, sampling the whole width and

depth – not just the top part. The size of sample taken should be 1½ times the estimated volume required for testing.

- Let very first concrete go
- Take a scoopful from part 1
- Take a scoopful from part 2
- Take a scoopful from part 3
- Take a scoopful from part 4
- Let the last concrete go



Complete a sampling certificate and record which sampling method was used.

The alternative spot sample BS EN 206-1:2000, clause 5.4.1

Do not use this method to make cubes

For an early check on the consistence of concrete delivered in a truck mixer, this alternative method of spot sampling from the initial discharge may be used. Additional tolerances

will be applicable for concrete sampled by this method.

Scoopfuls must be taken through the moving stream sampling the whole width and depth.

- Let very first concrete go
- Take six scoopfuls from the next 0.3 m³
- Take six scoopfuls after the first 0.3 m³ has been discharged

The slump test BS EN 12350-2

Step 1

- Empty the sampling buckets onto the mixing tray
- Scrape each bucket clean

Step 2

- Thoroughly remix the sample, shovelling into a heap
- Turn the heap over to form another
- Do this three times



Step 3

- Flatten the final heap by repeatedly digging-in the shovel vertically
- Lift the shovel clear each time

Step 4

- Ensure the slump cone and base plate are clean and damp
- Place the metal plate on solid level base away from vibration or other disturbance
- Place the cone on the plate and stand on the foot-pieces

Step 5

- Fill the cone in three equal depth layers
- Use the standard slump rod
- Rod each layer 25 times
- Spread the blows evenly
- Heap the concrete above the top of the cone before rodding the third layer over the area
- Make sure the rod just penetrates the layer below



Step 6

- Top up if necessary
- Use the rod with a sawing and rolling motion to strike the concrete level with the top of the cone



Step 7

- Carefully clean off spillage from sides and baseplate whilst maintaining foot pressure

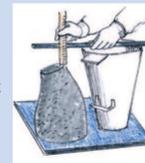
Step 8

- Carefully lift the cone straight up and clear, to a count of between 5 and 10 seconds



Step 9

- Lay the rod across the upturned slump cone
- Measure the distance between the underside of the rod and the highest point of the concrete – the true slump
- Record the distance to the nearest 10 mm
- Check and record the kind of slump
- If the slump isn't true, take a new sample and repeat the test
- If the second slump isn't true, get advice
- Complete the sampling and testing certificates



You will need this equipment (always clean and dry the equipment after use)

- ✓ Small scoop
- ✓ Slump rod
- ✓ Square-mouthed shovel
- ✓ Mixing tray
- ✓ Buckets or wheelbarrow
- ✓ Sampling and testing certificates
- ✓ Steel rule
- ✓ Damp cloth
- ✓ Sampling scoop
- ✓ Slump cone and rigid metal plate

The flow test BS EN 12350-5

First find a suitable location for the flow table. It must be placed on a firm, flat and level surface. It may be necessary to prepare an area for the table.

Step 1

- Empty the sampling buckets onto the mixing tray
- Scrape each bucket clean

Step 2

- Thoroughly remix the sample as described for the slump test

Step 3

- Ensure the mould and table are clean and damp
- Place the mould on the centre of the table and stand on the foot-pieces
- Fill the mould in two layers, tamping each layer ten times with the tamping bar
- If necessary add more concrete to fill the top layer
- Use the tamping bar to strike the top layer level with the top of the mould



Step 4

- Carefully clean off spillage from around the mould and table top

Step 5

- Wait 30 seconds from striking off
- Carefully lift the mould straight up and clear to a count of between 3 and 6 seconds



Step 6

- Stabilise the flow table by standing on the toe board at the front of the table

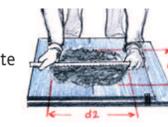
Step 7

- Slowly lift the table top by the handle until it reaches the upper stop
- Allow the table to fall freely
- Repeat this cycle to give a total of 15 drops
- Each cycle should take about 4 seconds



Step 8

- Measure the largest dimension of concrete spread in two directions, parallel to the table edges



- Record the flow value as d1 + d2 divided by 2
- Report any segregation which may have occurred around the sample edge
- Complete the sampling and testing certificates

You will need this equipment (always clean and dry the equipment after use)

- ✓ Sampling scoop
- ✓ Small scoop
- ✓ Damp cloth and plastic sheeting
- ✓ Buckets or wheelbarrow
- ✓ Tamping bar
- ✓ Brush and mould oil
- ✓ Curing tank
- ✓ Hide hammer
- ✓ Mixing tray

Making cubes BS EN 12390-2

Collect a composite sample to the standard method described above. Concrete sampled using the alternative spot method must not be used to make cubes.

Step 1

- Check that the moulds are clean and lightly oiled with all bolts tightened so that there will be no leakage
- Ensure that the correct halves of the moulds are used and that the corner lifting pins are correctly located
- Thoroughly remix the sample as described for the slump test

Step 2

- Fill the mould with concrete in 50 mm layers using the tamping bar, compact the concrete with no fewer than 25 tamps for each of the two layers in a 100 mm mould and no fewer than 35 tamps for each of the three layers in a 150 mm mould
- For very high workability concrete you may not need the minimum number of tamps



Step 3

- After tamping of each layer, tap the sides of the mould with the hide hammer until large bubbles of air cease to appear on the surface and the holes left by the tamping bar are closed

Step 4

- Remove surplus concrete and smooth over with a float
- Wipe clean the mould edges



- Number the moulds for identification and record details

Step 5

- Cover each mould with a damp cloth and plastic sheet
- Store inside at room temperature (15-25°C) e.g. on top of the curing tank
- Protect the cube moulds at all times from high and low temperature (especially sub-zero temperatures) and drying winds
- Complete the sampling and cube making certificates

You will need this equipment (always clean and dry the equipment after use)

- ✓ Sampling scoop
- ✓ Small scoop
- ✓ Damp cloth and plastic sheeting
- ✓ Buckets or wheelbarrow
- ✓ Tamping bar
- ✓ Brush and mould oil
- ✓ Curing tank
- ✓ Hide hammer
- ✓ Maximum/minimum thermometer
- ✓ Square-mouthed shovel
- ✓ Felt tip pen or crayon
- ✓ Cube moulds
- ✓ Spanner
- ✓ Mixing tray
- ✓ Damp cloth
- ✓ Sampling, cube making and storage certificates

Storing cubes BS EN 12390-2

The cubes should be removed from the moulds at between 16 and 72 hours after casting.

Step 1

- Record the maximum/minimum overnight storage temperatures on the certificate

Step 2

- Slacken all nuts
- Part the sides of the mould, tapping gently with the hide hammer

- Lift off carefully
- Remember new cubes are easily damaged unless handled carefully

Step 3

- Mark each cube with its identification number on two of its cast sides



Step 4

- Place the cubes in the curing tank
- Clean and reassemble the moulds

Step 5

- Check that the water temperature is controlled at 20°C ± 2°C and the cubes are covered by water
- Make sure the power supply is not switched off day or night

- Check the temperature range daily using the maximum/minimum thermometer
- Keep a record of the readings

Step 6

- For despatch to test laboratory, wrap the wet cubes in damp cloths, and then plastic bags and pack in trays
- Attach the certificates for sampling, testing, cube making and storage to the package – along with the order for testing



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SAFETY

The first rule of working with concrete is to be protected.

Ensure that the personnel are wearing adequate safety equipment.

- If fresh concrete touches the skin, it can cause

alkali burns – some of which, don't cause pain immediately – or dermatitis.

- The longer the skin is in contact with the concrete, the worse the injury will be. So, protect yourself by wearing safety goggles, waterproof gloves, a sturdy jacket, waterproof trousers and long boots.

- If concrete does contact your skin, wash immediately and thoroughly with clean water. If your eyes are affected, seek medical help immediately.

- The water in the curing tank is highly alkaline so ensure that gloves are used when handling cubes in the tank.

- **Lifting** Fresh concrete is heavy, with a barrow load weighing over 100 kg. So carrying just a small volume may cause physical injury. Follow Health & Safety regulations so that you can place, compact and finish the work before it sets without straining yourself.