

# STRENGTH OF AGGREGATE

## *Purpose*

*To determine the resistance of aggregate to crumbling under impact. This test is regularly used by the Ministry of Transport to test road aggregate and the figure obtained from this test is called the "aggregate impact value".*

## *Instructions*

*Safety. The steel cylinder is heavy and is a potential hazard. It should stay on the floor except when in use. Keep it lying down. Do not stand it on its end or put it on the bench.*

- 1. Choose a rock type, sieve the aggregate and keep those fragments which pass through the 16mm sieve and are caught on the 8mm sieve.*
- 2. Weight out exactly 100g of these fragments (w1).*
- 3. Place the steel block on the floor in the tray and hold the plastic tube on the block and put the 100g of rock into the tube.*
- 4. The first person holds the tube firmly pushing it down onto the block. The second person lifts the steel cylinder and lowers it slowly into the tube until the line is level with the top of the plastic tube. The steel cylinder is then dropped.*
- 5. Pull the cylinder up as far as the line and then drop it again. Repeat this until you have dropped the cylinder 15 times. When pulling the cylinder up the arrows indicate when you are approaching the line.*
- 6. Collect all the crushed rock including the dust. Do this by tapping the tube on the metal block or by poking any fragments that are jammed in. Sieve all the fragments and the dust through the 2mm sieve.*
- 7. Weigh both the fraction that passes through (w2) and that which is larger than 2mm (w3).*

8. The aggregate impact value is  $w_2/w_1 \times 100$ . Check that  $w_1 = w_2 + w_3$  or is within 3g of it.

## Teacher's Section

### Requirements

Steel cylinder 5cm diameter and about 67cm long, should weigh about 10kg

Steel plate 15cm square 1cm thick

Plastic pipe 48cm long to fit tightly over the cylinder but still allow it to slip.

Jubilee clip to fit around plastic pipe

Gravel of several different rock types (from driveways or piles beside roads) If you break up rocks to produce the aggregate for testing remove any flaky bits.

Sieves 16mm, 8mm and 2mm and pan

Tray larger than 20cm by 20cm by 10cm deep

Balance

Small trays to weigh samples in

### Making the equipment (15minutes)

Put a bold line around the cylinder 5cm from the end or so that it has a fall of 40cm. Put arrows for 5cm above that line to indicate, when the cylinder is being lifted out, the line has nearly been reached.

Put the jubilee clip on the end of the plastic pipe, it will help prevent it splitting.

### Notes

Steel cylinders can be picked up from metal scrap dealers, the exact size does not matter but it should weigh about 10kg and you will need a plastic pipe which fits around it.

The steel cylinder is heavy and is a potential hazard. It should stay on the floor lying down and not be balanced on its end. Beware of males using it as a phallic symbol.

There is normally some loss in weight between  $w_1$  and  $w_2 + w_3$ . 3% is acceptable.

The tube will need replacing every so often.

The experiment should be performed outside as it is dusty and the thumping would irritate nearby classes. I have never had any flying fragments of rock but safety glasses would be a wise precaution.

**Reference**

*Collis L and Fox R A 1985 Aggregates Geological Society of London*

**Checks**

*Make sure students are dropping the cylinder from the correct height.*

**Results**

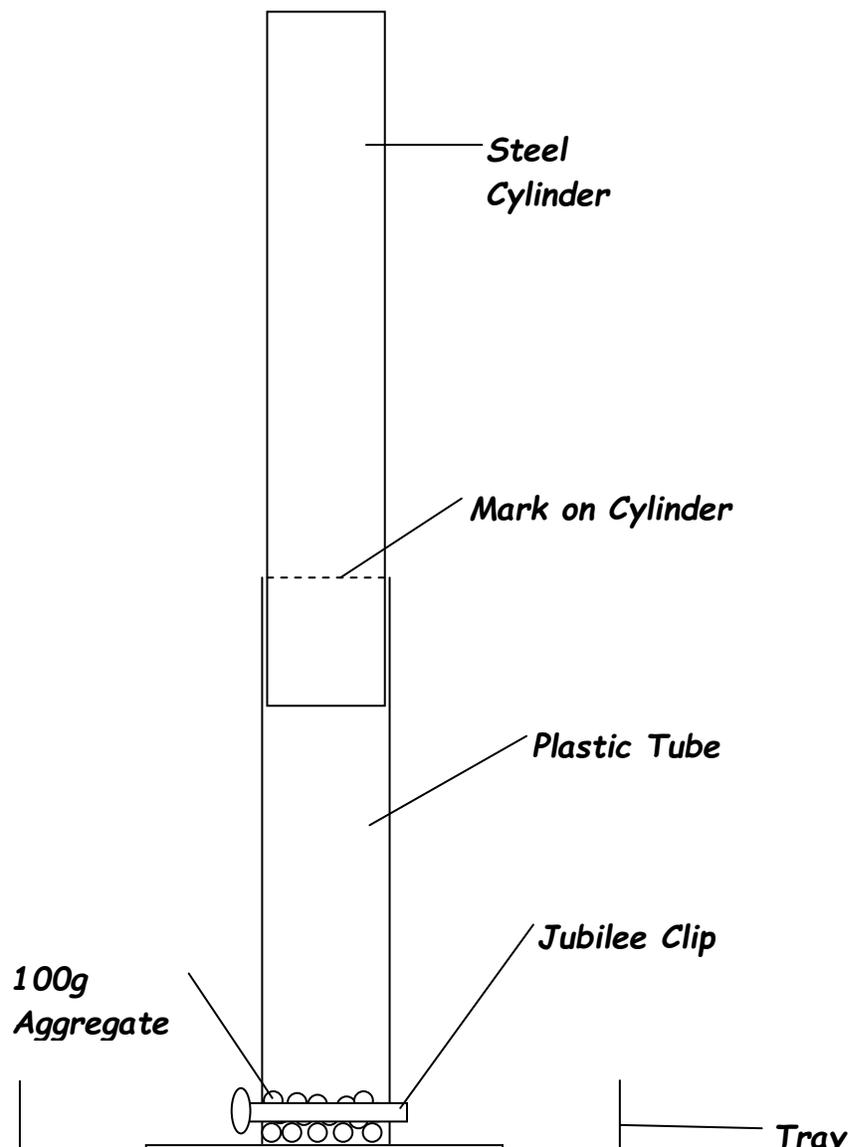
*Basic igneous and granite are the strongest i.e. have the lowest values*

**Time**

*15 minutes per sample including all sieving and weighing.*

**Cost**

*The steel cylinder will cost £33 if bought new but cylinders can be found or bought very cheaply from scrap merchants.*





*Strength of aggregate*