



**Lightweight Concrete
Aggregate**

7.3 SAMPLE MIX DESIGNS FOR BST CONCRETE

The following table shows the mix proportions for one cubic metre⁽¹⁾ of various densities of BST Concrete made from BST#300 Lightweight Concrete Aggregate.

DENSITY (kg/m ³)	400	600	800	1,000	1,200	1,400	1,600	1,800	2,000
------------------------------	-----	-----	-----	-------	-------	-------	-------	-------	-------

MIX PROPORTIONS

Cement (kg) ⁽²⁾	250	350	350	350	450	450	450	450	500
10 mm Aggregate (kg) ⁽³⁾	-	-	-	-	-	-	500	650	750
Sand (kg) ⁽³⁾	-	80	250	450	550	750	450	500	550
BST Aggregate (litres) ⁽⁴⁾	1,000	950	850	800	750	700	650	600	500
Water (litres) ⁽⁵⁾	150	150	160	160	160	160	160	160	180

TYPICAL AVERAGE COMPRESSIVE STRENGTHS

Compressive strength (MPa)	0-0.5	1-2	3-4	6-8	8-10	12-14	14-18	22-25	25-30
----------------------------	-------	-----	-----	-----	------	-------	-------	-------	-------

NOTES

- 1 Trial mixes are recommended in all applications as variations in yield and density can occur with variations in local materials. The above mix proportions have been developed by concrete consultants to BST using Type GP cement and locally available Sydney aggregates. Abrams Marketing Pty Ltd, BST Suppliers Pty Lts and BST Distributors offer no warranty that the above mix proportions will produce the same densities, yields and strengths with other materials.
- 2 Mix designs have been based on Type GP cement. Fly ash may be used as a partial replacement for cement. However, fly ash has been found to suppress some of the air entrained by the BST coating compound. This can result in underyielding and, consequently, higher than planned densities. Users should undertake trial mixes to verify mix proportions.
- 3 All aggregate weights are based on a saturated, surface dry condition. Sands should be 50% coarse and 50% fine.
- 4 BST #300 aggregate is supplied in 200 litre bags or bulk bags to 1.6 m³ capacity. When carrying out trial mixes, note that the BST volumes quoted above are based on a "settled" volume of BST. The loose volume of BST is 15% greater than the "settled" volume.
- 5 Water reducers should be used at the manufacturer's dose rate.



7.4 SITE MANUFACTURE OF BST CONCRETE

This information sheet describes the method for mixing BST Concrete on site in a small concrete mixer. Mixers are generally 3 cu ft or 0.1 cu metres capacity, which is about one wheelbarrow full of concrete.

MATERIALS

Cements

BST Concrete Sample Mix Designs have been based on Type GP cement. Other types of cement are suitable, but their effect on yield and performance should be determined before using them in production.

Note that the BST coating generates some 12% entrained air in the concrete. Consequently, if it has been found that the use of fly ash blended cements can suppress some of the entrained air (as will occur in standard concrete). Yield losses of up to 6% have been measured in trials with fly-ash blended cements. Trials of such cements are strongly recommended before using them in production.

Aggregates

In BST Concrete, aggregates consist of -

Sand - which should be fine to medium grade washed sands. A blend of 50% coarse and 50% fine sand provides the optimum mix. Do not use sands containing silt, such as "brickies" sand.

10 mm aggregate -

in densities over 1,400 kg/m³

BST#300 aggregate -

which is supplied in 200 litre bags or bulk bags to 1,600 litres.

Admixtures

Use admixtures which comply with AS1478 as for standard concrete. Generally, water reducing admixtures are used with BST Concrete. Water reducers of the lignin or lignin polymer base are preferred. Melamine based products do not perform well with BST.

Set retarders are commonly used in hot, dry weather conditions. BST Concrete mixes have high cement contents and low water/cement ratios. Therefore, they will set faster in hot weather. BST Concretes do not bleed, so the surface will dry faster in hot, dry and windy conditions.

MIXING

The following procedure is recommended.

- 1 Place the full quantity of sand and cement into the mixer.
- 2 With the mixer running, add about two thirds of the mixing water and mix thoroughly to produce a well mixed slurry.
- 3 Add the full quantity of BST aggregate gradually and continue mixing.
- 4 Continue mixing while adding sufficient of the remaining mixing water to achieve the desired workability of the mix.

NOTES

- 1 Do not put hands into the mixer while it is turning.
- 2 Take care in loading BST aggregate in windy conditions. It is very light and will easily blow away.
- 3 Dispose of surplus material or washout water thoughtfully to prevent BST aggregate and cement from entering stormwater drains.

MEASURING PROPORTIONS

The Sample Mix Designs show quantities for one cubic metre of BST Concrete. For small, site mixers of 0.1 cu metre capacity, use one tenth of the proportions shown.

Cement and sand are given in kilograms. BST aggregate and water are given in litres. It is often convenient to measure quantities in 10 - 20 litre plastic containers.

For cement and sand, weigh out the correct quantities into a container and mark where the material comes to in the container. Thereafter, fill the container to the appropriate mark for each batch.

Similarly, mark on another container where the correct quantity of water come. After the first batch, endeavour to use exactly the same quantity of water each time to ensure consistency from one batch to the next.

The BST aggregate quantity will usually be between 70 and 90 litres per batch. Consequently, four or more 20 litre container loads of BST will be required. Alternatively, it may be possible to estimate the quantity from the bag, which contains 200 litres.

When measuring BST aggregate into containers, shake down the contents to achieve the correct volume.

Use a separate container for each different material - ie for each of the cement, sand, water and BST aggregate.

RELATED INFORMATION SHEETS

Other BST Concrete Information Sheets related to the above include -

- 1.4 Health and Safety Information (Material Safety Data Sheets)
- 7.3 Sample Mix Designs

FURTHER INFORMATION AND ORDERS

For further information about BST or for placing orders, contact your local BST Distributor, or contact: