

7.2 MANUFACTURE OF BST CONCRETE – PREMIXED

1 MATERIALS

Cements

BST Lightweight Concrete sample mix designs have been based on Type GP cement. Other types of cement are suitable, but their effect on yield should be determined before using them in production.

Note that the BST coating chemical generates some 12% to 15% of entrained air in the concrete. Consequently, it has been found that fly ash with high residual carbon can suppress some of the air entrainment, 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 recommended before using them in production.

Aggregates

In BST Lightweight Concrete, aggregates consist of the following –

Sand which should be fine to medium grade. 50% coarse sand and 50% fine sand is recommended for optimum mix consistency

10 mm aggregate
used in densities over 1,400 kg/m³

BST Lightweight Concrete Aggregate
supplied in 200 litre bags or 1,000 litre and 1,500 litre bulk bags

Water

Mixing water is to be clean and suitable for the manufacture of standard concrete.

Admixtures

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

Set retarders are commonly used in hot, dry weather. BST Lightweight Concrete mixes have high cement contents and low water-cement ratios and will, therefore, set faster in hot weather. BST Lightweight Concrete does not bleed, and so the surface will dry faster in hot and windy conditions.

2 BATCHING

The following procedure is recommended.

- 1 Place the full quantity of BST Lightweight Concrete Aggregate into the agitator. [Note –the BST Lightweight Concrete Aggregate may be added after the other materials if preferred].
- 2 With the agitator running at mixing speed, add the cement, sand, 10 mm aggregate (if any), admixture and mixing water. Mix thoroughly for the rated mixer time.
- 3 Adjust the workability by the careful addition of water as necessary.
- 4 Continue mixing at mixing speed for the rated mixing time, as for standard concrete.

It is recommended that load sizes be only about 80% of the rated capacity of the agitator – eg. 4 m³ in a 5 m³ agitator. Particularly for low densities where the agitator will contain a large quantity of BST Lightweight Concrete Aggregate, this may chock the loading hopper when the cement, sand etc are first dropped into the agitator. The potential for this to happen only exists for the first few revolutions of the agitator, after which the BST Lightweight Concrete Aggregate becomes incorporated with the other materials.

Take care in loading BST Lightweight Concrete Aggregate in windy conditions. The BST Aggregate is extremely light and will easily blow around.

In washout pits, use a swimming pool scoop or similar to remove BST Lightweight Concrete Aggregate particles from the top of the water.

3 DELIVERY

Delivery of BST Concrete is the same as for standard concrete.

4 IMPORTANT NOTES

The following matters should be considered.

- 1 BST Concrete mixes have high cement contents and low water-cement ratios, particularly at densities above $1,000 \text{ kg/m}^3$. Therefore, take the necessary precautions for hot weather concreting in such conditions.

- 2 Because the BST Aggregate is made from polystyrene it is compressible, particularly at high pump pressures. Pumps should be operated at low pressures, around 50 bar.

For pumping heights above ten stories, it may be necessary to modify the mix design to compensate for the loss of volume and consequent increase in density from compression of the mix. BST distributors have adjustment factors for these situations.

For the same reasons, dramatic reductions in pump line diameters (such as from 150 mm to 50 mm) can result in high pump pressures and compression of the mix. BST Concrete is best pumped through a 150 – 200 mm diameter steel line. The use of long lengths of small diameter rubber lines is discouraged and will generally lead to compression of the mix.

- 3 The low density 400 kg/m^3 density BST Concrete mix contains little sand and can be difficult to mix and pump. Water content in this mix is more critical than for higher densities. If using this density, pump lines must be cleared between loads if continuity of supply cannot be achieved.

- 4 It is preferable to dedicate a specific number of trucks to a pour. This avoids the need to wash out trucks between loads if they are varying between standard concrete and BST Concrete. Always wash out thoroughly on completion of a BST Concrete load to avoid particles of BST Aggregate appearing in subsequent loads of standard concrete.

5 TESTING BST CONCRETE

BST Concrete should normally be specified by density. If a strength specification is required, thorough trials are recommended.

BST Concrete densities are dry densities. This means dry at ambient conditions, not oven dry. Plastic densities are some 50 kg/m^3 higher than dry densities.

Slumping BST Concrete is not as meaningful measure of workability as for standard concrete, particularly at densities below $1,200 \text{ kg/m}^3$. Workability has to be judged by the concreter or the pump operator. Too dry a mix will look crumbly, whereas too wet a mix will appear sloppy.

A separate information sheet on testing of BST Concrete is available.



More information

For further information on BST Lightweight Concrete and its applications contact –

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