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British Standard

Concrete admixtures

Part 3. Specification for superplasticizing admixtures

Adjuvants de béton

Partie 3. Adjuvants de superplasticité — Spécifications

Betonzusatzstoffe

Teil 3. Zusatzstoffe mit hochgradig verflüssigender Wirkung

British Standards Institution

Foreword

This Part of BS 5075 has been prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Committee and is based on an initial draft provided by the Cement Admixtures Association. This Part of this standard incorporates such recommendations of other organizations as the Technical Committee felt were appropriate, and is based on the results of cooperative tests carried out in accordance with earlier drafts of this Part.

This Part of this standard is concerned only with superplasticizing and retarding superplasticizing admixtures. Accelerating, retarding and water-reducing admixtures are covered by BS 5075 : Part 1, and air-entraining admixtures are dealt with in BS 5075 : Part 2. Admixtures for mortars are covered by BS 4887.

This Part of BS 5075 specifies acceptance tests which demonstrate the ability of a particular formulation to meet stipulated performance requirements, and admixture uniformity tests which demonstrate that a particular consignment is similar to material which has previously been submitted to the acceptance tests. Either may be carried out by the vendor or at an independent laboratory at the request of the purchaser.

In the acceptance tests, provision has been made for the diverse applications of superplasticizing admixtures in practice and the differing chemical nature of those available. Some of the tests are therefore relevant to the use of superplasticizing admixtures to produce very high workability, whilst the remainder are relevant to obtaining very large reductions in water content.

In the first of these applications, it is usually the intention to produce flowing concrete without drastic alteration of the mix designs employed for normal concrete. Excessive bleeding, segregation, retardation or air-entrainment are undesirable, however, and should not be promoted by the use of superplasticizing admixtures in this type of concrete.

In the second application, a large reduction in water content is required without loss of workability or excessive alteration in the stiffening time. The compressive strength after 24 h is expected to be considerably greater than that of a mix containing no admixture. This does not necessarily apply to retarding superplasticizing admixtures.

The principle has been followed of having one test mix concrete at the same water/cement ratio as a control mix to establish the effect of the admixture on workability and strength. In a second test mix, a fixed water reduction is made and the concrete is tested against specified requirements for workability, stiffening time and strength. An upper limit is placed on the air content of the concrete in both test mixes.

Workability can change rapidly immediately after mixing. However, tests have shown that a relatively stable state is attained within 10 min to 15 min from the completion of mixing and this time has been selected for establishing initial workability. In the case of flowing concrete, there is usually a tendency for the effect of the superplasticizing admixture on workability to diminish steadily with time and, in order to ensure adequate retention of the initial high workability, a requirement for loss of workability on standing has been introduced.

The stiffening time test, which is carried out on mortar sieved from the concrete, is used to determine the times required for a standard needle to indicate a resistance to penetration of 0.5 N/mm² and 3.5 N/mm². Work has shown that the time to reach a resistance of 0.5 N/mm² corresponds approximately to the extreme limit for placing and compacting concrete, and the time to reach a resistance of 3.5 N/mm² gives a guide to the time available for the avoidance of cold joints.

No requirements for tests on hardened concrete have been introduced, apart from those relating to compressive strength. Drying shrinkage, creep, and long term durability are still under investigation, and the effect of superplasticizing admixtures on these properties should be the subject of advice from the admixture manufacturer.

The admixture uniformity tests include determination of dry material content, ash content and chloride ion content. The standard requires that the chloride content of the admixture shall be declared so that the user will be fully aware of the amount of chloride that will be introduced into the concrete, and if necessary will be able to take appropriate precautions.

When a purchaser requires a certificate stating that an admixture complies with this Part of BS 5075, the manufacturer should provide the information given in 6.1. Additional information relating to the correct use of the admixture as given in 6.2 should also be made available on request.

The performance of superplasticizing admixtures should be assessed in the particular concrete to be used because the performance may be affected by changes in concrete composition.

Certification. Attention is drawn to the certification facilities described on the inside back cover of this standard.

Compliance with a British Standard does not of itself confer immunity from legal obligations.