Workability and quality control of concrete pdf

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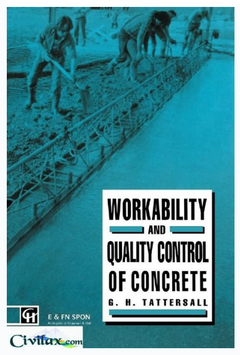
WORKABILITY
AND
QUALITY CONTROL
OF CONCRETE
G. H. TATTERSALL
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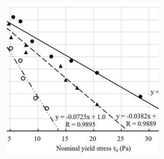
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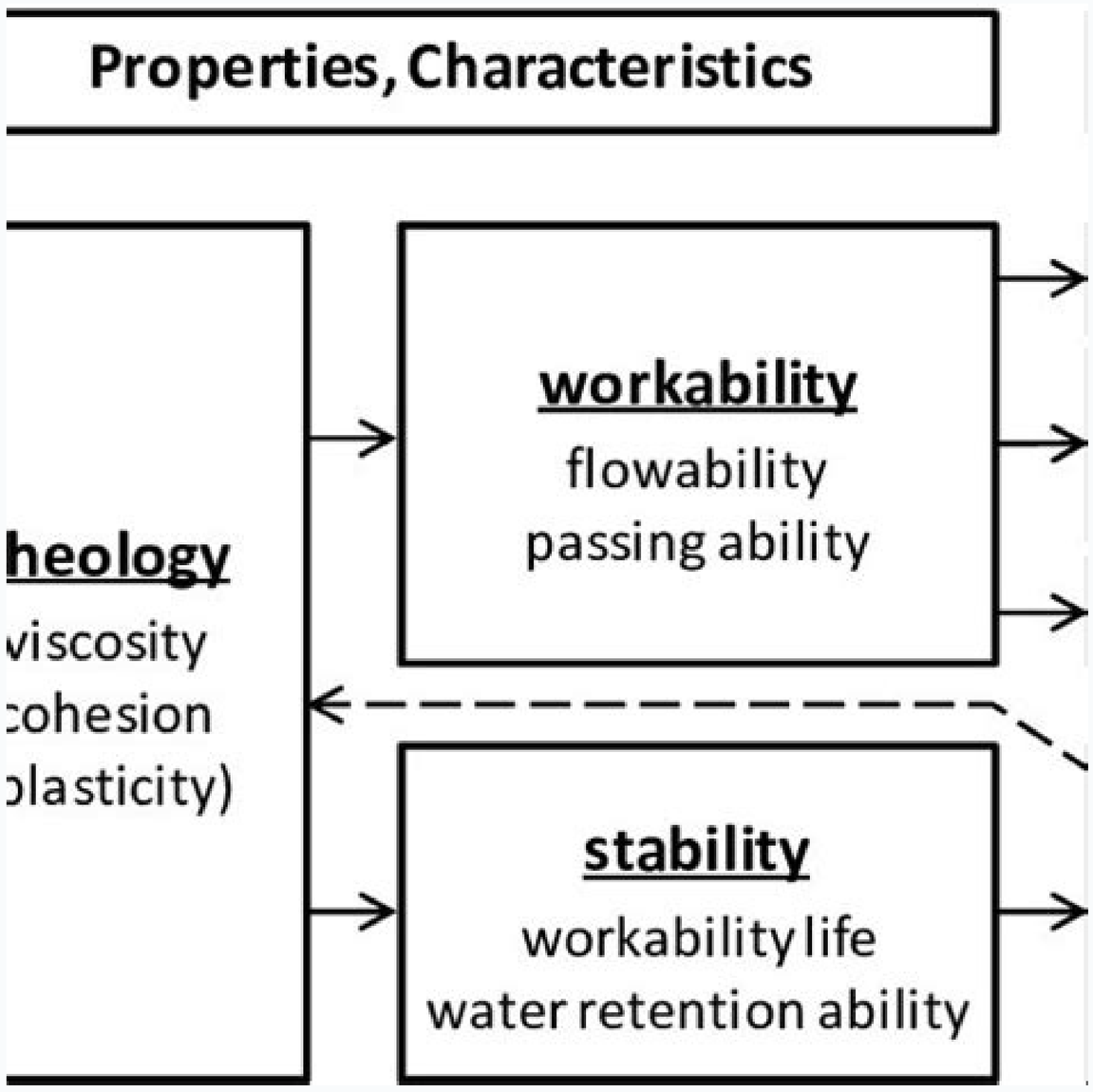
Nominal yield stress τ_0 (Pa)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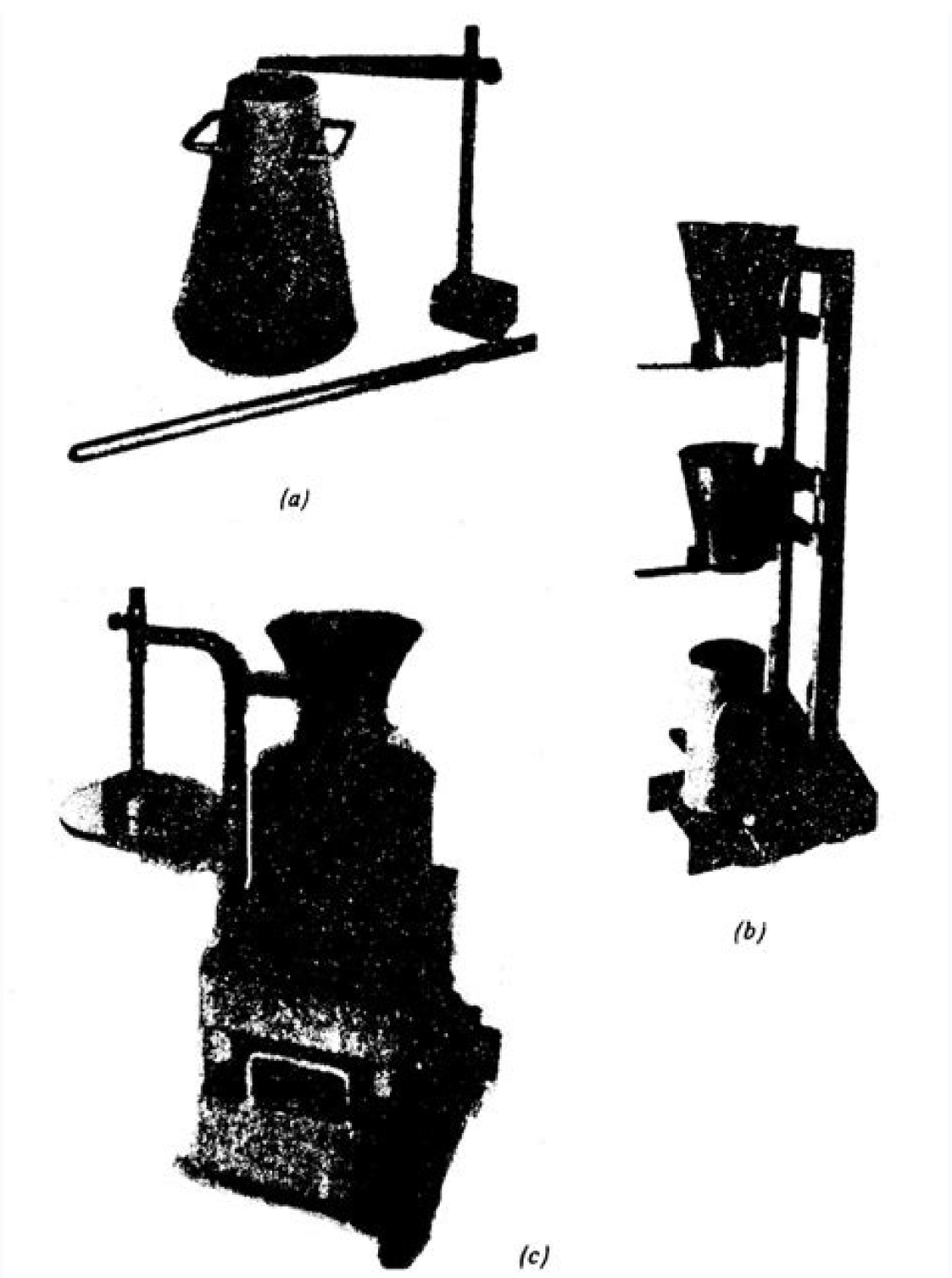

Quality control of concrete definition. What is workability of concrete and why is it important. What is workability of concrete. What is workability of concrete definition.

Quality Assurance and Quality Control (QA/QC) Organized by: Construction Development Board, CDB College of Science and 10:41 PM civil concrete The word workability is a term that refers to properties of fresh concrete, that is, of the concrete before it has set and hardened, and it is legitimate to ask why any attention should be given to these properties at all. The performance of concrete will in practice be assessed in terms of whether the hardened material performs in the way intended and continues to do so: it will be judged in terms of shape and finish, strength, deflection, dimensional changes, permeability and durability. So why should the properties of the fresh concrete be considered to be important, and why should they be the concern of the practising engineer? The answer to the first of these questions lies in the fact that the properties of any finished material are affected by the properties at an earlier stage and by the processes applied to it, while the answer to the second one is that all, or a major part of, the processing of concrete is actually carried out on site. The first stage is, of course, the making of a homogeneous mix and then, assuming this has been done properly, the material is subjected to other processes as follows. The concrete must be capable of giving a good finish direct from the formwork, without honeycombing or an excessive number of blowholes or other surface defects. If there is a free surface, it must also be capable of giving a good finish in response to an operation such as floating or trowelling. A workable concrete is one that satisfies these requirements without difficulty and, in general, the more workable it is, that is, the higher its workability, the more easily it can be placed, compacted and finished. Workability can be increased by simply increasing the water content of the mix but, if that method is used, a point will be reached at which segregation and/or bleeding become unacceptable so that the concrete is no longer homogeneous and, before that, the water/cement ratio may have reached a level such that the hardened concrete will not attain the required strength. LINK Skip to main contentDiscover Fresh concrete must be produced with the properties required for its intended applications, for example, it must be workable enough to flow into formwork, and to be compacted. This book deals with the measurement of the flow properties of fresh concrete and the factors which affect its workability. Aspects of concrete mixes and control of manufacture to produce optimum properties which relate to workability are covered. The importance of workability. Standard tests for workability. Flow properties of fresh concrete. Principles of measurement. The two-point workability test. Workability expressed in terms of two constants. Extremely low workability concretes. Factors affecting workability. Effect of mix proportions. Effect of chemical admixtures. Effect of cement replacements and fibres. Workability and practical processes. Specification of workability. Workability measurement as a means of quality control. Quality of concrete construction on site can be accomplished in three distinct stages as followQuality control before concretingQuality control during concretingQuality control after constructionStage-1 (Quality Control Before Concreting)This stage of quality control consists of two steps.Checking of specification requirements regarding excavation, forms, reinforcement and embedded fixtures etc.Control test on concrete ingredients (i.e. on cement, aggregate & water)CementQuality of cement is ascertained by making compressive strength tests on cement cubes. However for effective control cement:Should be tested initially once for each source and subsequently once for every two monthsShould be protected from moistureShould be retested after 3 months of storage, if long storage in unavoidableShould be rejected if large lump are found in cement bags.AggregateConcrete aggregates should confirm to specified values as per standard specification.The quality of concrete is affected by different physical and mechanical properties of aggregate, i.e. shape, grading, durability, specific gravity and water absorption etc. these properties of aggregated should be tested before using it for concrete production.The quantity of deleterious materials and organic impurities should also be tested.Bulking of sand is also an important property in several ways. It gives wrong results when volume batching is done. It increases water cement ratio which in turn reduces strength.For effective control aggregates:Are required to be tested once initially for approval of sourceShould subsequently be tested once or twice daily for moisture content and allowance should be made for moisture content of aggregates.WaterThe quality of water should be checked for the requirements as specified in respective standard. Chemical analysis shall be conducted for approval of source. In case of suspended impurities, it is necessary to store water for some time to allow them to settle down. In case of doubt concrete cubes made with this water are tested. Average 28 days compressive strength of at least three cubes or cylinders or specified size, prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water.Stage-2 (Quality Control During Concreting)Careful supervision during concrete manufacture is necessary for all concreting operations such as batching, mixing, transporting, laying, compacting and curing. Following precautions should be taken during concreting operation.The concrete mix should be designed in the laboratory with the materials to be used on site.As far as possible concrete should be batched by weight. If weight batching is not possible, then volume batching may be permitted through proper supervision in the presence of engineer in charge.During mixing the mixer should be charged to its full capacity. The materials should be fed in proper sequence. The speed of the mixer should be range from 15 to 20 revolutions per minute. The mixing time should not be less than 2 minutes in any case. Segregation should be avoided while unloading the concrete from the mixer.Workability of concrete is an important property of concrete while concrete is in its fresh state. Therefore slump test or compaction factor test should be performed to check workability of concrete. About three tests should be carried out for every 25 m3 of concrete.Care should be taken so that no segregation takes place during transportation of concrete.Concrete should not be dropped from a height of more than 1 m. if the drop height exceeds 1 m chutes should be used.To avoid re-handling of concrete it should be placed at its final position as far as possible.Vibrators should be used for compacting concrete. The insertion spacing of internal vibrators should not be more than 0.6 m. It should be drawn out slowly so that no holes remain in the concrete. The frequency of vibrators should not be less than 7000 cycles/minutes.Curing should be done for a specified period so that concrete develops requisite strength. Concrete should be covered with hessian as soon as it becomes hard.The form work should correspond to final form of the structure. It should be checked before concreting is started. The inside of the forms should be cleaned and oiled. The forms should be removed after the specified period.Concrete should be protected from hot and cold weather at early ages. Concreting should not be done at temperature below 4.50C and above 400 In very hot weather water and aggregates should be cooled. Retarders of approved quality can be used.In very cold weather water and aggregates should be heated. Accelerators of approved quality can also be used.Stage-3 (Quality Control After Construction)Once the concrete is laid and compacted, compression tests are made on the cubes made out of this concrete. For ordinary concrete, cubes are made out of the concrete made at work site.The hardened concrete has to be checked for trueness in dimensions, shape and sizes as per design specification. General surface appearance of concrete should also be checked. Dimensions are ascertained by different measurements. Reinforcement should have adequate concrete cover and if the reinforcement is visible in part of a structure, the part should be rejected or necessary actions should be taken accordingly.Concrete strength is normally to be ascertained from cube or cylinder samples tested at 28 days. In case the strength obtained is less than the specific minimum, one or more of following steps may be taken.Load test and measurement of deflection and / or strain (the quality of the structure can then be ascertained by calculating back the concrete strength)Cutting cores from the structures and testing them for strengthNon destructive tests like Schmidt rebound hammer or ultrasonic pulse velocity test. These tests give only a very rough idea and are primarily used to ascertain the uniformity of construction.Chemical analysis of hardened concrete. You're Reading a Free Preview Pages 10 to 21 are not shown in this preview. You're Reading a Free Preview Pages 26 to 28 are not shown in this preview. You're Reading a Free Preview Page 33 is not shown in this preview. You're Reading a Free Preview Pages 38 to 54 are not shown in this preview. You're Reading a Free Preview Pages 59 to 62 are not shown in this preview. You're Reading a Free Preview Pages 73 to 80 are not shown in this preview. You're Reading a Free Preview Pages 90 to 114 are not shown in this preview. You're Reading a Free Preview Pages 119 to 128 are not shown in this preview. You're Reading a Free Preview Pages 134 to 143 are not shown in this preview. You're Reading a Free Preview Pages 152 to 160 are not shown in this preview. You're Reading a Free Preview Pages 164 to 174 are not shown in this preview. 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