

— MIXING

a. General. - The concrete ingredients shall be thoroughly mixed in mixers designed to assure uniform distribution of all the component materials throughout the concrete at the end of the mixing period.

The concrete, as discharged from the mixer, shall be uniform in composition and consistency from batch to batch. Mixers will be examined regularly by the Government for changes in condition due to accumulation of hardened concrete or mortar or to wear of blades. The adequacy of the mixing will be determined by the Government in accordance with the concrete uniformity requirements of ASTM designation: C 94, annex A1. Samples of concrete for such tests will be taken from any size batch which is commonly mixed during concrete production. For testing purposes, the Contractor shall mix, in the mixers to be tested, the size of batch directed by the Government inspector at the batch plant, and shall assist in collection of required samples from that batch.

Any mixer that at any time produces unsatisfactory results shall not be used until repaired. If repair attempts are unsuccessful, a defective mixer shall be replaced.

Batch size shall be at least 10 percent of, but not in excess of, the rated capacity of the mixer.

b. Central mixers. - Water shall be admitted prior to and during charging of the mixer with all other concrete ingredients. After all materials are in the mixer, each batch shall be mixed for not less than 90 seconds.

The Government will increase the minimum mixing time required as need is indicated by results of the concrete uniformity tests. Excessive overmixing which requires additions of water to maintain the required concrete consistency will not be permitted.

The mixing equipment shall conform to the following additional requirements:

- (1) Plant configuration shall be such that the mixing action of each mixer shall be observed from a safe location which can be easily reached from the control station. Provisions shall also be made so that the operator can observe the concrete in the receiving hopper or buckets as it is being dumped from the mixers.
- (2) Each mixer shall be controlled with a timing device which will indicate the mixing period and assure completion of the required mixing period.
- (3) The batch plant shall be equipped with an interlocking mechanism which will prevent concrete batches from entering mixers which are not empty.

c. Truck mixers. - Truck mixers shall be equipped with a watermeter, accurate to within 1 percent of the total mix water, located between the water supply and mixer. The watermeter shall have a dial or digital indicator. Truck mixers shall also be equipped with a reliable

revolution counter for indicating the total number of revolutions of the drum for each batch. The revolution counter shall be visible from the operator control area and shall be reset to zero for each batch. Truck mixers shall have a metal plate attached in a prominent place indicating the manufacturer's recommended drum capacities, in terms of volume, and the maximum and minimum speeds of rotation for both mixing and agitating.

Initial mixing shall be continued for not less than 70 revolutions nor more than 100 revolutions of the drum after all the ingredients, except approximately 5 percent of the water which may be withheld for tempering, are in the drum. The mixing speed shall be not less than 12 revolutions per minute nor more than 22 revolutions per minute. Except as specified, additional water shall not be added to the concrete after the initial introduction of mixing water to the batch. Additional tempering water may be added to the batch on arrival at the placement when the concrete slump is less than specified; however, the design water content and specified slump shall not be exceeded. After this tempering, additional water shall not be added to the concrete. After addition of tempering water, mixing shall be continued at the specified mixing speed for a minimum of 30 revolutions. After a prolonged period of agitation, 10 to 15 revolutions of the drum at mixing speed will be required just prior to discharging. Discharge of the concrete shall be completed before the drum has revolved a total of 300 revolutions.

Each batch of concrete, when delivered at the jobsite from commercial ready-mix plants, shall be accompanied by a batch ticket in accordance with ASTM designation: C 94.

3-14-86 Revisions: Revised subparagraph c. Other minor revisions.