



Quantum Readymix Concrete

THE MOST COMMON REASONS WHY CUBE/CONCRETE FAILURE IS EXPERIENCED

The purpose of this TIP is to provide a checklist of trouble shooting possibilities one can work through to determine the cause of cube/concrete failure. RMC companies are often phoned with the message "your concrete has failed" whereby all panic sets in. The list of possible causes of failure has been documented in Fultons Concrete Technology 5th Edition. As a RMC supplier we attempt to highlight those incidents that are most common to our industry. Reams can be written about each topic and we only intend to give the reader some useful pointers in this regard.

CURING TANK TEMPERATURE

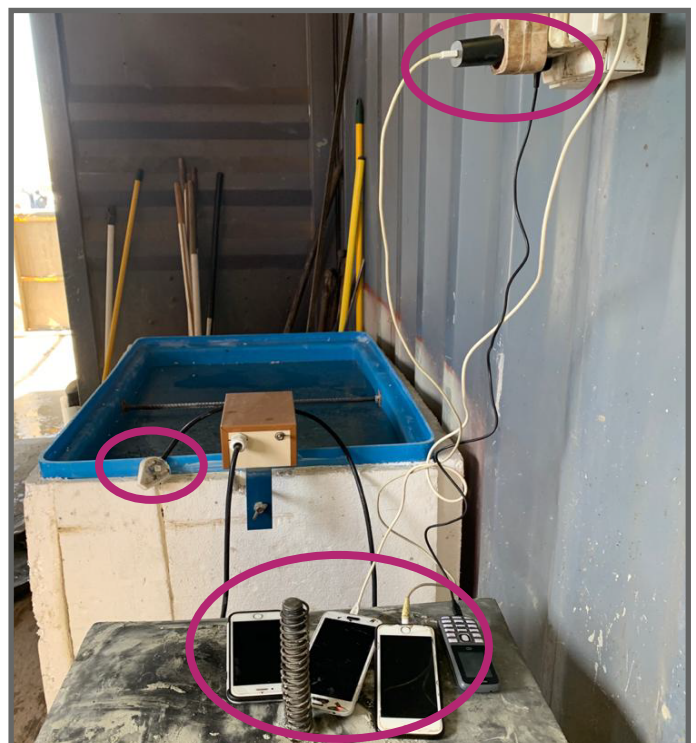
Keeping the curing tank temperature at between 22°C -25°C is vital to its continuous strength development of concrete. Concrete ceases to gain strength below 5°C and the temperature of an unheated curing tank in winter, even under cover can easily be as little as 10°C. Our experience is that since electrical connections are in short supply on site a cell phone needs to be charged or a kettle boiled and the electricity to the curing tank is disconnected for lengthy periods. The culprits are never found, it is virtually impossible to say for sure that such an incident happened, so be aware, most site staff are ignorant of how critical this can be. Thermostats and heater elements are often only those adapted from geysers, their sensitivity and reliability are also questionable.

DENSITY OF CUBES

Improperly made cubes can normally be seen with the naked eye. In recent years, the industry has progressively had to use PLASTIC cube moulds on site due to the theft of steel moulds. Technicians are consequently more careful when making cubes in order to avoid damaging them and as a result not all the air is expelled. Being less durable, the quality of the concrete cube itself is not what it should be unless moulds are constantly renewed. Five percent air can result in a reduction of about 30% of the strength of the concrete. In a cube this can be manifest by a cube that should weigh 2,5kg (in the case of 100mm cubes) weighing 2,4 Kg, not much you will agree but red flags should go up and further investigation needed. Often it is just laboratory error, but it needs further investigation.

DRYING OUT OF CUBES

Cubes are often made on a Friday or before a long weekend. As a result, they often only get into the curing tank 3-4 days after casting. Concrete needs water to cure and gain strength and depending on the degree of drying out or temperature (low or high) results may be unexpected. Steel is a good conductor and depending under what conditions they have been stored as well as the period a marked influence can be expected. A 7-day result may in fact be only a 3-4 day result sowing seeds of doubt and confusion.



● Curing tank disconnected to charge cellphones on a daily basis.



● In the above photograph plastic moulds are in use and to avoid damaging the cube a steel rod is being used for compaction. The effective compaction (and strength) of cubes under such circumstances is suspect.

SLUMP CONTROL

Generally RMC trucks are dispatched to arrive on site with a slump of 75mm to 100mm BUT site personnel will find that placing and distribution of concrete so much easier if the concrete is more mobile and the addition of extra water is often the norm. Drivers reluctantly accept this inevitability and all they do is mark the extra addition of water on the delivery note although they are often told not to as the docket will then not be signed (it happens).

TRUCKS STANDING ON SITE FOR LENGTHY PERIODS

This (together with short supply) is a common problem, particularly in the case where columns are cast, or the site is not adequately prepared for concrete. Since water will be added to maintain slump, the quality of concrete will deteriorate after 30 minutes, especially in summer. Don't forget the truck was probably dispatched an hour before it arrives on site where it is now unloaded over the duration of up to 2 hours or longer in summer!!! Cubes taken at any point over this duration WILL FAIL. Most RMC companies do not guarantee their concrete beyond a half hour standing time on site.

CHANGES IN INCOMING RAW MATERIALS

This is a lengthy topic, but all incoming raw materials need to be monitored ALL the time. Variations in sand and cement are the most common problems but are in no way limited to these two materials only. The onus is on the RMC supplier to implement safety checks that ensure the consistency of all ingredients. Eliminating and limiting raw material variability remains one of the industry's biggest headaches. Changes in the mining act that make the aggregate producer responsible for the rehabilitation of the quarry/pit at the end of its life has only exacerbated the problem.

INCORRECT SAMPLING OF CONCRETE

The sketch below depicts the correct way to take a concrete sample, but this is only possible on a fast discharge. In the case of columns or when water is to be surreptitiously added a sample is taken from the first wheelbarrow so to speak. If so and unless the drum is spun at high speed (and even then) the sample will not be representative of the full load of concrete.

WEIGH BATCHING EQUIPMENT

Whilst electronic weigh batching equipment has improved the situation a lot, the regular calibration of both the cement and aggregate weighting equipment is paramount. Water is normally best weighed as opposed to metered. Admixture dispensers are known to block up resulting in another unwanted variable.

TESTING MACHINES & NON-COMPLIANT LABORATORIES

A degree of variability will always exist between laboratories and their crushing machines. Make sure that the laboratory testing your concrete is accredited to do ALL the concrete/aggregate tests you require done. It is not acceptable to have a bitumen or soils laboratory test your concrete if they are not accredited to do the tests you need done. This is even more of a problem when concrete cores are to be drilled, cured and tested. The interpretation of the core result also needs to be made by a competent, experienced senior technician.

Many is the time that the concrete core will be seen as having failed when the SABS test for cores deems that if the result is within 80% of the specified strength it will be deemed to have passed.

The Sampling procedure

Take at least nine increments at equally spaced intervals during the period of discharge avoiding the first and the last 10% of the mixer truck contents.

