

EFFECT OF JARRING ON FRESH CONCRETE

Jarring of concrete during hardening may occur as in construction along railroads due to vibration from passing trains, or in paving a bridge floor while traffic is passing over the bridge.

Tests and experience indicate that concrete will usually harden with no loss of strength under these conditions.

Results of tests made at the Research Laboratory of the Portland Cement Association are given in the accompanying table. Three groups of mortars were cast in 3-gang, 2-in. cube molds and were vibrated immediately after molding for periods up to 24 hours, after which they were removed from the molds and moist cured until tested at 7 days. The mortar cubes vibrated for periods longer than one hour in Group 1 lost a great deal of water because of the violent tapping action.

stronger than those not vibrated. Increase in strength is due to loss of water from the mix.

In another series, concretes of 1:1½:3, 1:2:3½ and 1:2½:5 mixes were vibrated by placing cylinder molds on a vibrating platform for periods up to 10 minutes after placing the concrete. Tests indicate there was no loss of strength for these periods of vibration.

Bulletin 3 of the Structural Materials Research Laboratory, Lewis Institute, entitled "Effect of Vibration, Jigging and Pressure on Fresh Concrete," reports tests of concrete which had been allowed to cure for several hours before being subjected to about 30 drops on a jigging table. These data indicate an increase in strength due to jigging after undisturbed periods up to 4 hours, and slightly less increase when jigged after 6 hours. The 6-hour specimen, however, was still about 20% stronger than the specimen made without jigging.

Report of Committee 101 in *Proceedings of The American Concrete Institute*, Vol. 27, refers to tests made at University of California. For one group, the aggregate had an appreciable excess of fines. In another, the fine aggregate was the minimum which would produce a workable mix. After molding, specimens were subjected to jigging, which varied from ½ to 1½ hours and from 33 to 154 vibrations per minute. Average increase in strength for Group 1 was 13% and for Group 2, 19%, the maximum increase being 40%. The highest rate of jigging gave the best results.

While placing concrete in ships built by the U. S. Shipping Board during World War I; air hammers were used to settle the concrete which was placed very slowly into the forms. The air hammer was applied a few feet from where the concrete had been placed 2 to 24 hours previously. There was no evidence of ill effects from this. In fact, concrete in one ship examined after 10 years exposure in sea water was found in unusually good condition.

RELATION OF VIBRATION TO STRENGTH

Duration of Vibration hr.	Compressive Strength at 7 days lb. per sq. in.		
	Group 1 Violent Vibration and Tapping	Group 2 Violent Vibration Without Tapping	Group 3 Gentle Vibration
0	4080	3650	3760
1	6600	5800	4220
2	6190	6200	4430
3	5780	5920	3570
5	5450	5870	3850
6	5170	5360	4750
24	5900	5060	4560

The feature of these tests was that regardless of treatment given, all vibrated cubes hardened satisfactorily and, except for one case, were always

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