



CERAMIC TILE INSTITUTE OF AMERICA, INC.
12061 Jefferson Blvd., Culver City, CA 90230-6219

CTIOA REPORT 75-2-2 (R-85)

**SUBJECT: Mixing Methods “Thinset Portland Cement Mortar”
“Latex Type Portland Cement Mortar”**

FOREWORD:

We have heard for some time that thin-set portland cement mortar and latex type portland cement mortar could be weakened in strength by high speed mixing. It was believed that the loss of strength was not significant, so not much attention was given to the item.

Due to a recommendation of our CTI Technical and Job Problem Committee, and our Thin-Set and Grout Committee, test studies were conducted by CTI.

1. INTRODUCTION

1.1 This subject needs to be discussed, and is important to our tile trade, because of the large amounts of these two bonding material which are used currently in the installation of ceramic tile.

2. BACKGROUND INFORMATION:

- 2.1 The ANSI Specification A108.5 is the Standard Installation Specification for both thin-set L(Dry-Set) portland cement mortar, and latex type portland cement mortar.
- 2.2 ANSI A108.5 has information on mixing the bonding mortars, but does not say what kind of mixing device to use.
- 2.3 A quote from ANSI A108.5 is "Unless mortar manufacturer's instructions differ, mix Dry-Set mortars in accordance with the following directions:
Add dry ingredients to -water, mix thoroughly and let mortar stand for 15 minutes; then remix."
- 2.4 The manufacturer's directions on the container do not have much more information than that in ANSI A108.5.
- 2.5 Observations made at most job sites show that a drill motor, capable of high speed mixing, is used to mix the bonding mortar.

3. DISCUSSION

3.1 CTI decided that first we would make some 2" x 2" cubes, of both kinds of mortar, cure them for seven days, and then conduct compression tests on them.

3.2 Three mixing techniques would be used:

Hand mixed for 3 minutes.

Mixer at slow speed for 3 minutes

Mixer at high speed for 3 minutes

3.3 The results are attached to this Field Report, and we were shocked at the results.

3.4 We then decided to conduct two additional kinds of tests:

One would be on shear specimens, made as required in our tests for these bonding materials. These specimens test the actual strength of the mortar.

The results confirmed the findings of the first tests.

3.5 The second group of tests was made on specimens bonded to concrete. This would simulate job site use of the material. This again confirmed the findings of the first tests and in addition, revealed consistent results in the hand mixed material but marked inconsistent results in both the low speed and high speed mixed materials.

4. CONCLUSION

4.1 Both kinds of mortar should be hand mixed or mixed in a device that will not whip it full of air bubbles.

4.2 Directions for this mixing should be clearly stated on the manufacturer's containers and literature.

4.3 See sheet of test data attached.

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SMITH-EMERY COMPANY

CHEMISTS • TESTING • INSPECTION • ENGINEERS

781 E Washington Blvd.
Los Angeles, CA 90021

File No. 819-74

Dates: December 2, 1974

Laboratory No: L-74-1816

Ceramic Tile Institute

ORDER #2312-T

700 North Virgil Avenue

Los Angeles, California 90029

SUBJECT: 7 DAY COMPRESSION TESTS ON 2" CUBES MADE OF LATEX
AND
THIN-SET MORTARS, USING VARIOUS MIXING TECHNIQUES.

REPORT OF TESTS

Hand Mixed – 3 Minutes:

Sample No.	Latex Mortar PSI	Sample No.	Thin-Set Mortar PSI
1	1175	4	2325
2	1250	5	2525
3	1250	6	2675
Average	1225	Average	2508

Mixer – Slow Speed – 3 Minutes

7	775	10	1200
8	750	11	1225
9	775	12	1250
Average	767	Average	1250
	37.4% Loss		50.2% Loss

Mixer – High Speed – 3 Minutes

13	200	16	950
14	250	17	900
15	250	18	975
Average	234	Average	942
	80.9% Loss		62.4% Loss

Respectfully Submitted
SMITH EMERY COMPANY