A Wet ⁄Dry Cycle Test for Grouts

Balaji Balachandran and C.Vipulanandan
Center for Innovative Grouting Materials and Technology (CIGMAT)
Department of Civil and Environmental Engineering
University of Houston, Houston, TX 77204-4003
Ph: 713-743-4291 E-mail address: bigbeesin@yahoo.co.in

Abstract
Chemical grouts are being used for reducing leaks in a number of Civil Infrastructure facilities; hence, it is essential to quantify the changes in the grout due to service conditions, such as a wet⁄dry cycle. This study was undertaken to verify the testing condition for a grout.⁄⁄

1) Introduction
The durability of a grout can be defined as the ability of the grout to withstand exposure to service condition in the vicinity of a sewer due to changes in the groundwater and sewer conditions. A Preliminary investigation was undertaken to establish the wet-dry testing condition for grout and grouted sands. The wet-dry cycle was performed on AV-118 grout on daily and weekly cycles. The changes in volume and weight were monitored under various testing conditions. A wet-dry cycle can mechanically deteriorate a grouted mass containing water as a major component so it is very essential to study their long-term effect on chemical grouts. Since excessive shrinkage can lead to faster deterioration of the grouts, performance of grouts and grouted sand must be verified under these conditions.⁄
⁄⁄

2) Objective
To investigate the effect of a daily wet-dry cycle on the behavior of a chemical grout.

3) Material And Methods
An N-methyloacrylamide grout namely AV-118 was selected for this study. The grout used for this test program was obtained from Avanti International, Webster, Texas. The molds and apparatus used where as per CIGMAT Standard GR-4. The setting time and temperature was measured for the grout mixes. The respective resins were mixed with initiators and water as suggested by the grout manufacturer recommendations. The Neat grout samples were made as per the CIGMAT-GR-4 Standard. For wet condition the grout Specimen was fully submerged in water and for the dry condition it was placed in sealed plastic bags having a humidity of 70-75%. The tests were carried out at room temperature.⁄⁄
⁄

4) Results and Discussion
The setting time of N-methyloacrylamide grout was around 28 seconds and the setting process was exothermic as shown in Fig.1 (a). The percentage increase in volume was about 44% to 48% and the percentage increase in weight was about 45% to 50% in case of AV-118 grout as shown in Fig.1 (b). It was noted that the humidity and temperature of the testing environment plays an important role in the water absorption and shrinkage properties of the grouts. A dry cycle leads to shrinkage of the grout and a wet cycle results in the expansion of the grout.

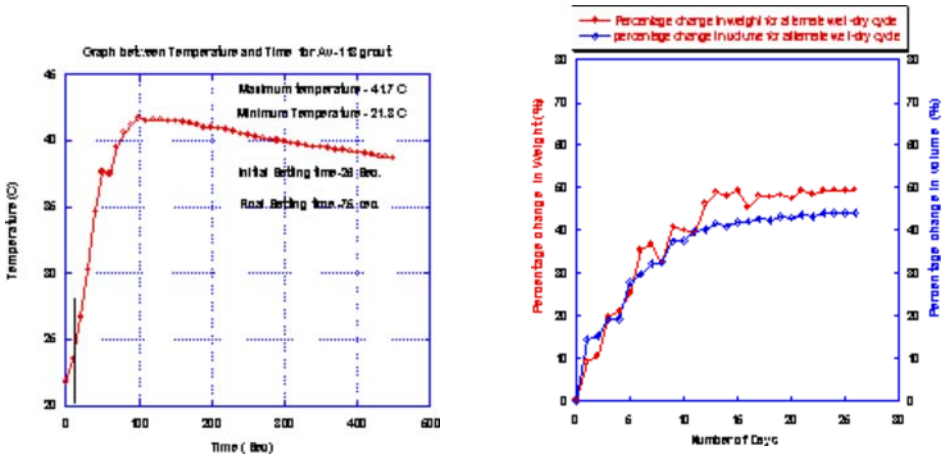

Figure 1.(a) Figure 1. (b)

Figure 1. (a) Setting time of grout and temperature during setting process; (b) Changes in weight and volume during the wet- dry cycle

5) Conclusion

The wet-dry cycle test on neat grout indicated that the grout has an initial increase in volume and weight but after two weeks changes are small. Testing conditions adopted in this study showed only a small change in weight and volume in the grout for wet dry conditions.

6) Acknowledgement

This work was supported by the Center for Innovative Grouting Materials and Technology (CIGMAT) under grants from NSF-International and various industries.

7) Reference

1) CIGMAT News and Literature Review, Vol. 1, No. 3 (1995), Center for Innovative Grouting Materials and Technology (CIGMAT), University of Houston, November 1995)

Standards

1) CIGMAT Standard GR-2 (Standards for measuring the compressive strength and stress- strain relationship of grout and grouted sand),
2) CIGMAT Standard GR-3 (Standard test method for wet and dry cycle resistance of grouts and grouted soils),
3) CIGMAT Standard GR-4 (Standard method for measuring unit weight of grouts and grouted sand).