

Study Of Durability Aspects Of Grout In Post Tension System

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Abstract: There are many factors affected in durability of the bonded post tensioning system. Grout properties, concrete cracked, high permeability of grout and grout contain voids, bleed water etc. In bonded post tensioned constructions the grout acts as a last line of defense for preventing initial corrosion. Corrosion protection for bonded, internal, post tensioning tendons are essential required in bonded post tensioning due to effectiveness of them.

This report includes general study of durability aspects through grout with the practical site experience and know the status of grout and grout properties in post tension system. This report also include the study of grout procedure and grout material properties. Also gives the required properties for high performance of grout. Further, includes the final results after completion of exposure testing of grout material and updating the durability design guidelines to reduce the corrosion risk of the post tensioning system. Compressive strength of grout material, standard bleed test and flow cone test are performed in this project and cebex 100 chemical admixtures, and various water cement ratio are used to develop high-performance grout. The purpose of research is to develop a high performance grout for post tensioning tendon.

Index Terms—grout , bonded post tensioning ,bleeding, grout admixture, strand ,tendon, duct.

I. INTRODUCTION

POST-TENSIONING

Portland cement grout is often used in post-tensioned structures to provide bond between the tendon and the surrounding concrete and also as corrosion protection for the tendons. Grout for bonded post-tensioning is a combination of portland cement and water, along with any admixtures necessary to obtain required properties such as fluidity, thixotropy, and reduced permeability. The grout plays a crucial role in the corrosion protection of the system since it may be the “**last line of defense**” against chloride attack of the post-tensioning strands. An optimum grout combines desirable fresh properties along with good corrosion protection.

TABLE 1.1 SCOPE OF WORK

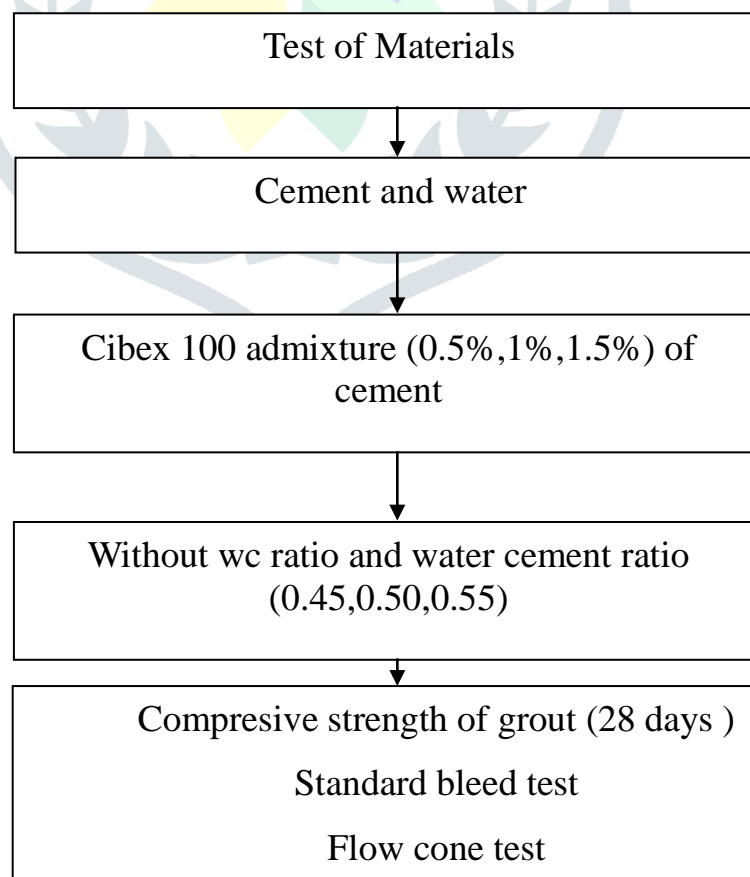
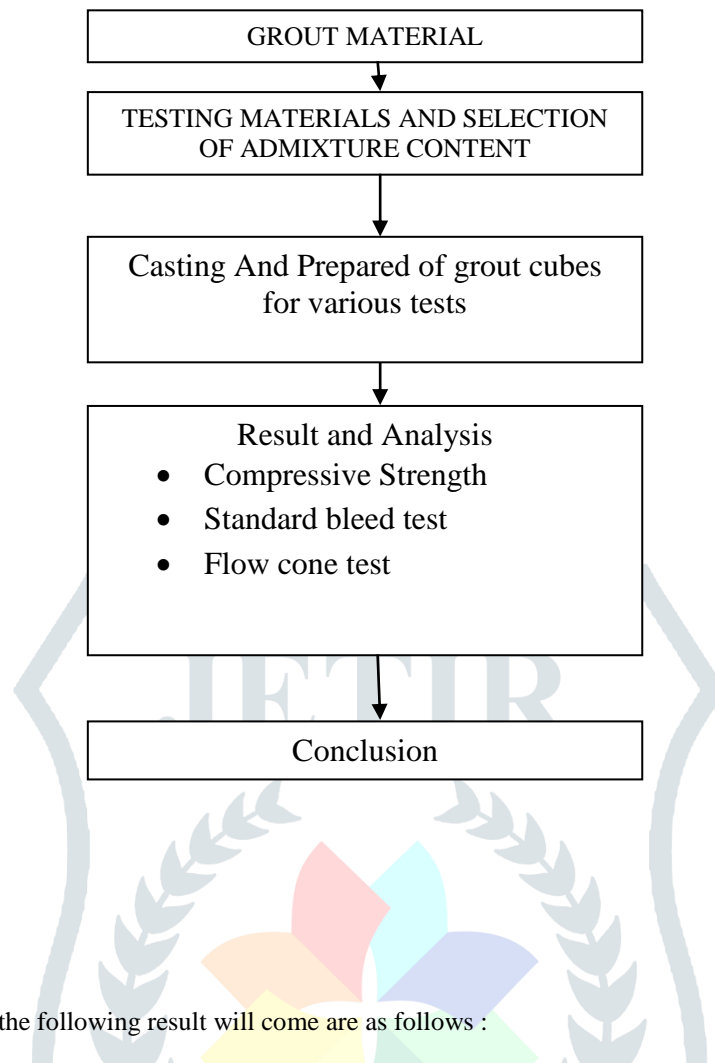


Table 1.2 Methodology



III. RESULTS

After Performing the analysis, the following result will come are as follows :

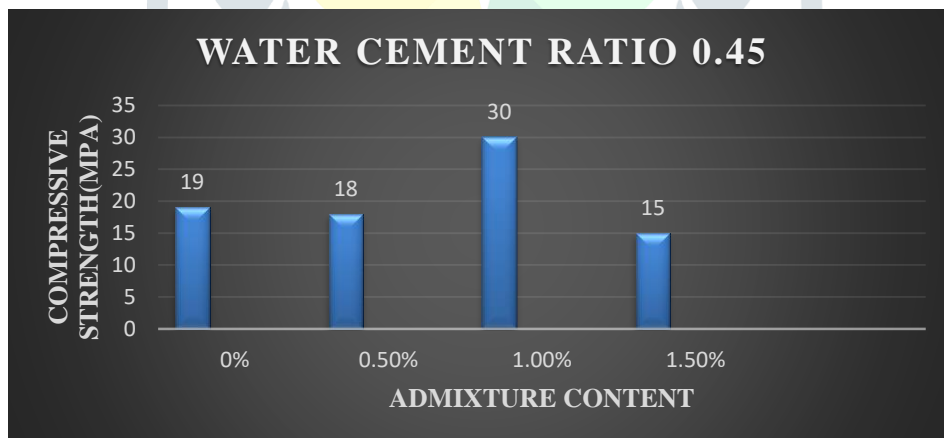


Fig 1.1 Compressive strength of grout for water cement ratio 0.45

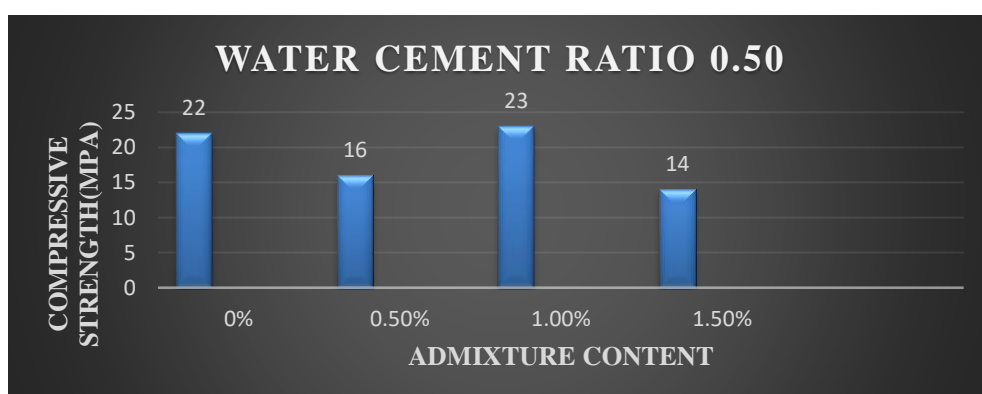


Fig 1.1 Compressive strength of grout for water cement ratio 0.50

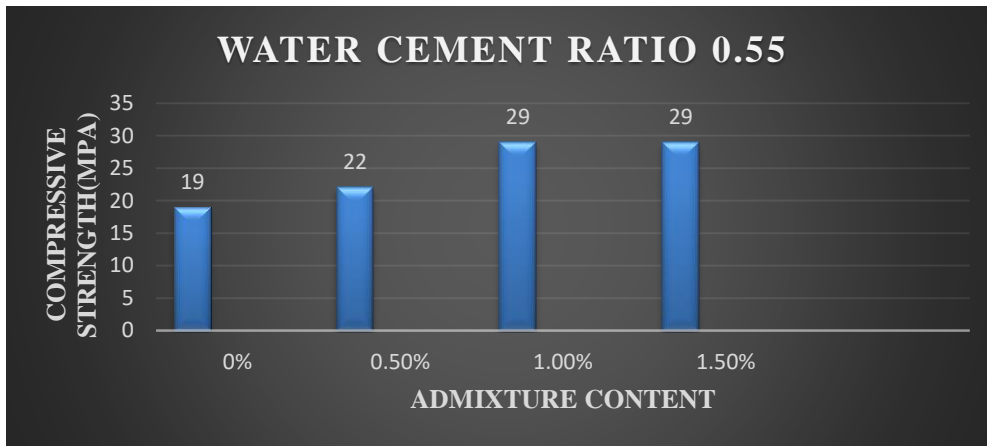


Fig 1.1 Compressive strength of grout for water cement ratio 0.50

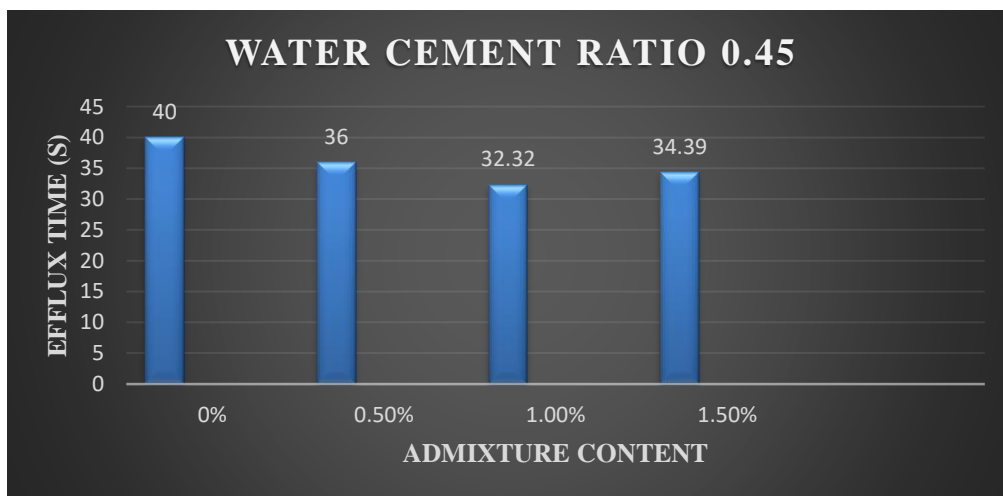


Fig 1.4 Efflux time for grout with water cement ratio 0.45

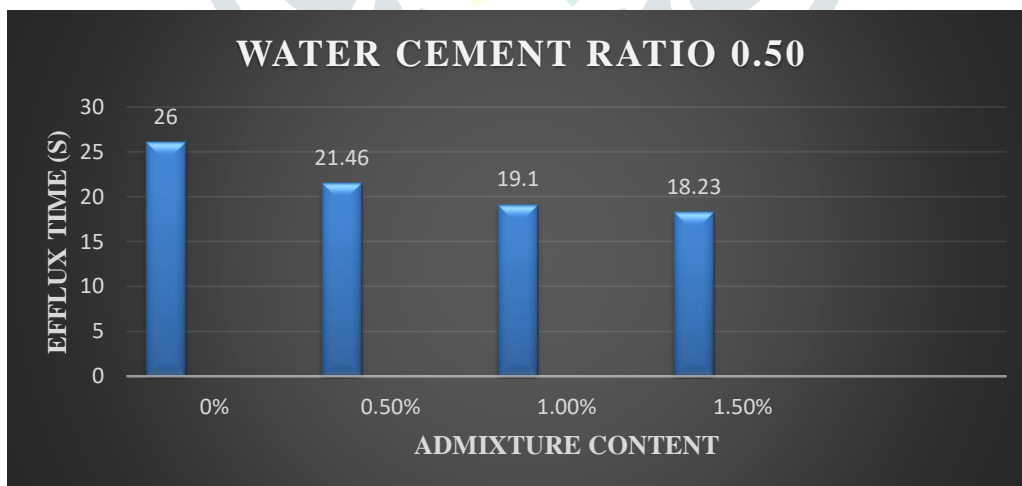


Fig 1.5 Efflux time for grout with water cement ratio 0.50

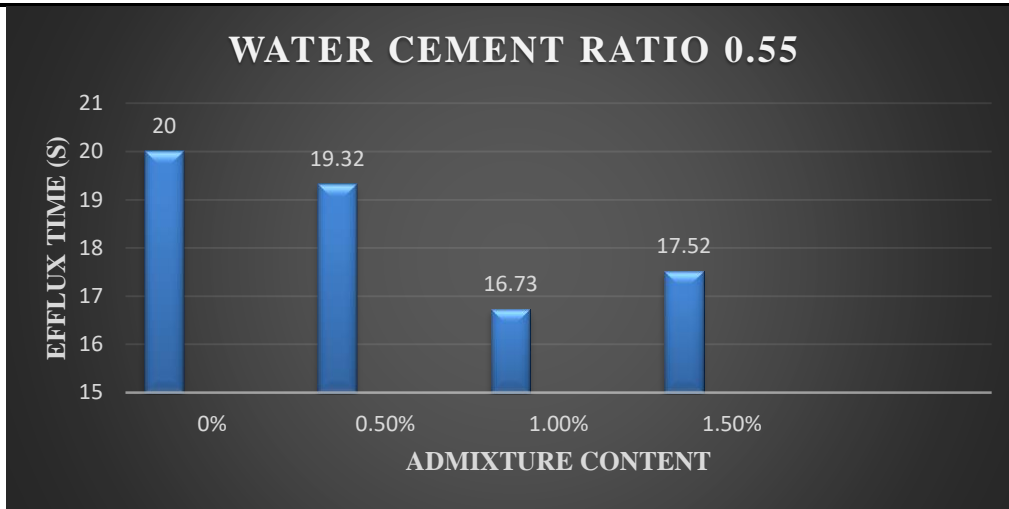


Fig 1.6 Efflux time for grout with water cement ratio 0.55

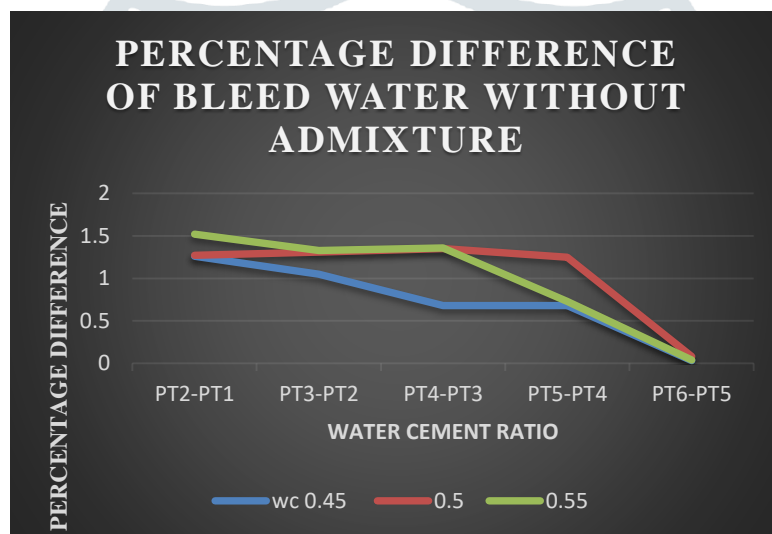
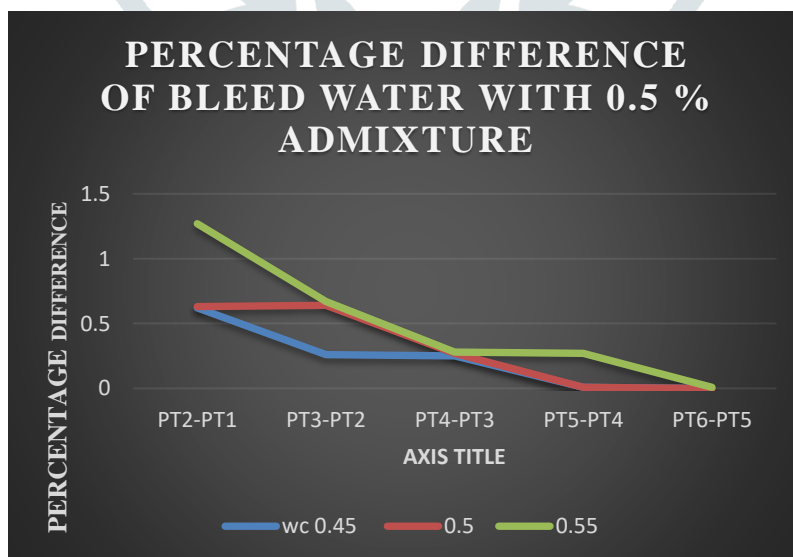


Fig 6.13 percentage difference of bleed water without admixture



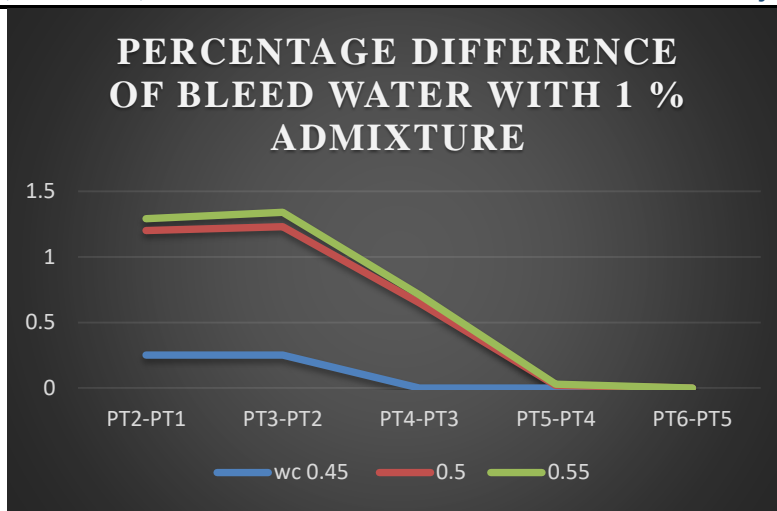


Fig 6.13 percentage difference of bleed water without admixture

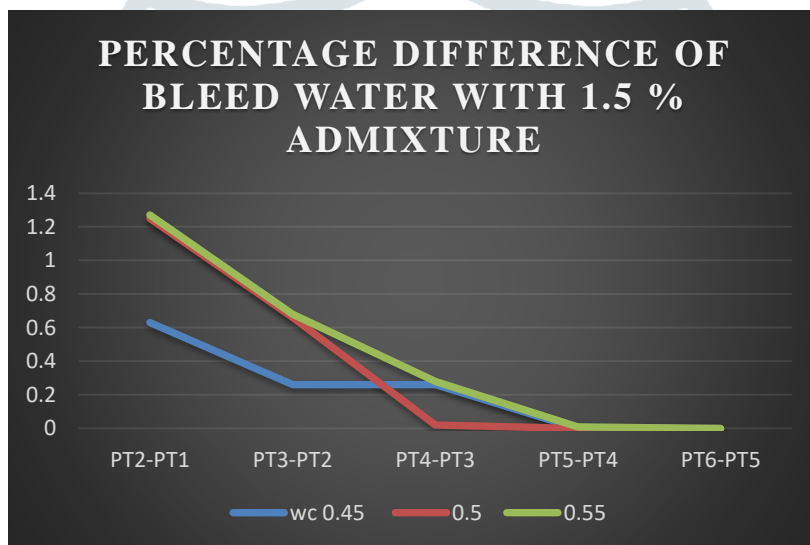


Fig 6.13 percentage difference of bleed water without admixture

CONCLUSION

- compressive strength of grout without admixture in case of Water cement ratio are 0.50 shows better results out of other cement ratio. The same has been observed in case of water cement ratio 0.5 with admixture content 0.5 % of cement.
- in case of 1 % admixture there is a considerable improvement in compressive strength.
- when the admixture is increase to 1.5 % ,water cement ratio 0.55 shows good results. But water cement ratio 0.45, 0.50 reduces compressive strength then without admixture case.
- overall performance of having admixture 1 % is better or superior than others in overall water cement ratios.
- efflux time for grout with Water cement ratio 0.45 shows pour results which is not acceptable as far as followability parameter is concern. There is a marginal improvement when water cement ratio is increased to 0.50
- when the water cement ratio is increased to 0.55 it shows superior results.as specially in case of 1 % admixture content gives the best results out of all combinations.
- percentage of bleed water gives unsatisfactory result without admixture,while 1 % of admixture content of cement gives lower percentage of bleed water while water cement ratio is 0.45 and 0.50.
- As per case study conducted, ungrouted sample grout in duct fails the structure before the life of structure.

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