

Compactness Concrete Influence on its Mechanical Strength. Tensile Strength Studies on Self Compacting Concrete Compared with Traditional Vibrated Concrete



Engineering

KEYWORDS : vibratory compaction, structural defects, tensile strength, self-compacting concrete

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ABSTRACT

Most of the structural defects of the damaged building elements are the result of faulty or absent of concrete compaction. Most often the vibrate quality remains in the responsibility of the worker who must find a balance between undervibration and overvibration of the concrete, both of them adversely affecting the durability and consequently the overall construction element. In these terms the authors aim to study the influence of compacting concrete on the mechanical performance of it by studying tensile strength in bending and splicing, on the composition of traditional vibrated concrete and one self-compacting concrete composition, knowing the fact that these two mechanical properties of concrete are responsible for cracking in concrete and for the penetration of aggressive substances in concrete harm to the whole structure of reinforced concrete.

INTRODUCTION:

The biggest problem facing manufacturers today is to ensure proper compaction of the concrete so that its construction elements made to present a durability over time. Vibrating concrete work is especially important in areas with natural or artificial aggressiveness, poor compacted concrete area is considered the main route of penetration of aggressive substances in concrete. The authors investigated the structural elements which are located in the aggressiveness marine environment of the Black Sea Coast.



Fig. 1- Construction element degraded located in aggressive marine environment of the Black Sea(authors photo)

TEST AND METHODS:

Based on these considerations authors aim to achieve comparative study of tensile strength by the two methods, tensile strength and flexural tensile strength of the splicing on the self-compacting concrete and traditional vibrated concrete composition. Determination of flexural strength of concrete in terms of estimating the area where cracking will occur, have a major importance for buildings located in the marine environment, given that the cracking in concrete is mainly responsible for aggressive substances penetration into the concrete.

Materials used in the tests consisted of the granitic rock aggregate from the Quarry Turcoaia ,from north of Dobrudja , IIAV42,5R Cement with fly ash produced by CRH (Romania) Medgidia Plant , carboxylatether based admixtures produced by BASF Romania. In the composition of self-compacting concrete was widely used and limestone filler , also produced by CRH (Romania) Hoghiz Plant .

In order to determine flexural tensile strength were made five prismatic specimens of self-compacting concrete and five prismatic specimens of traditional vibrated concrete with the dimensions 100X100X550mm. For 28 days the

samples were kept in water tanks at $20 \pm 2^\circ \text{C}$.



Fig. 2,3 Flexural tensile strength - (authors photos)

The results are presented as graphical and in summarizing table:

No.crt.	Ind. series	Initial weight sample	Weight 28 days	Ri 28
1	DRA01	32096	32154	4,12
2	DRA02	32450	32507	4,86
3	DRA03	32095	32150	3,85
4	DRA04	32605	32651	4,42
5	DRA05	32116	32162	5,01

Table 1- Summarizing table of flexural tensile strength, self compacting concrete case

No.crt.	Ind. series	Initial weight sample	Weight 28 days	Ri 28
1	DRA06	31805	31856	3,16
2	DRA07	31916	31960	3,51
3	DRA08	31760	31802	3,05
4	DRA09	31865	31905	3,72
5	DRA10	31890	31940	3,45

Table 2- Summarizing table of flexural tensile strength, traditional vibrated concrete case



Fig. 5,6- Splitting tensile strength - (authors photos)

The results are presented as graphical and in summarizing table:

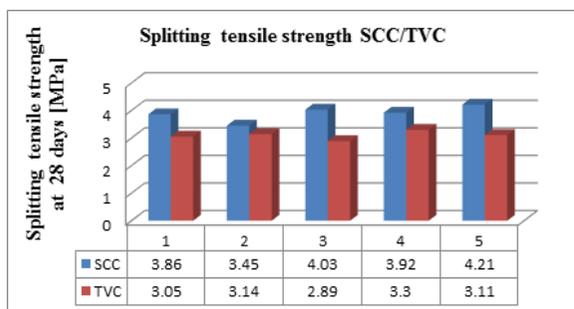
No.crt.	Ind. series	Initial weight sample	Weight 28 days	Ri 28
1	DRA11	11902	11968	3,05
2	DRA12	11851	11907	3,14
3	DRA13	11708	11762	2,89
4	DRA14	12005	12054	3,3
5	DRA15	11916	11970	3,11

Table 3- Summarizing table of splitting tensile strength ,self compacting concrete case

No.crt.	Ind. series	Initial weight sample	Weight 28 days	Ri 28
1	DRA16	12251	12284	3,86
2	DRA17	12406	12451	3,45
3	DRA18	12380	12401	4,03
4	DRA19	12516	12550	3,92
5	DRA20	12240	12282	4,21

Table 4- Summarizing table of splitting tensile strength ,traditional vibrated concrete case

Fig.7- Splitting tensile strength SCC/TVC



CONCLUSIONS:

From the studies, are found primarily a higher density of samples of self-compacting concrete compared with traditional vibrated concrete ;

In both situations, both in the case when determining the flexural tensile strength and in the case of determination splitting tensile strength is found higher values when compared the self-compacting concrete with traditional vibrated concrete ;

In traditional vibrated concrete case after splitting resulted a heterogeneous structure, porous, compared with self compacting concrete case where distribution of aggregates was uniform in composition hardened concrete, being devoid of pores;



Fig.8,9 -Self -compacting concrete structures compared with traditional vibrated concrete structure

Improved outcomes when compared the self-compacting concrete with traditional vibrated concrete, recommend to use self compacting –concrete in aggressive marine environment, the ways of penetration of aggressive substances in concrete is much reduced when using this type of concrete.

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