

# “EFFECT OF MAGNETIC WATER ON WORKABILITY OF CONCRETE”

**MR. SAGAR CHANDRAKANT ASHTEKAR**

**Prof. JAWALKAR G. C.<sup>2</sup>**

<sup>1</sup> ME Student, Civil Engineering Department.

<sup>2</sup> Assistant Professor, Civil Engineering Department.

<sup>1,2</sup> N.B.N. Sinhgad College of Engineering, Kegaon, Solapur

## **Abstract:**

In this research study, the effect of magnetized water on workability of concrete was studied. Data were collected from previous studies and researches. The magnetized water was prepared using the magnetic treatment system; it is device which called as magnetic water conditioner. This test was carried on three different grades of concrete which is M25, M30, and M35. Four concrete mixes were prepared, one without magnetized water and three with. Workability tests were carried out on all four mixes and it was found out that concrete produced by the magnetic technology is easy to operate without affecting the compressive strength of concrete. It was also found that magnetized water increases Slump value.

## **Keywords:**

Concrete mix; Slump cone; Compaction factor; magnetized water; Different Grades i.e. M25, M30, M35

## **1. Introduction**

The most important challenge for concrete technologists is to improve the properties of concrete. To improve the workability of concrete at less water content are the aims which most researchers are looking for using various methods.

If Magnetic water is used the workability can be improved and more strength can be achieved with less water content and further reduction in cost. The magnetic water treatment machine contains a powerful magnet which is the source of production of magnetic energy. This powerful magnet is fixed in a small tube with such high technology that can create a magnetic field reaching a high rate of about 6500 Gauss. Magnetically treated water (MTW) is water which has been passed through a magnetic field prior to use.

## 2. EXPERIMENTAL WORK

### A) OVERVIEW

For this investigation of effect of magnetic water on strength of concrete three different mix proportions are made which is M25, M30, and M35. For testing compressive strength four different combinations are made which are

- i. Casting & Curing in Normal water
- ii. Casting in Normal water & Curing in Magnetic water
- iii. Casting in Magnetic water & Curing in Normal water
- iv. Casting & Curing in Magnetic water

### B) MATERIAL

The cement used is Ordinary Portland cement of 53 grade manufactured by J.K.Cement Company. Crushed granite stone of maximum size 20mm conforming to IS 383-1970 used as coarse aggregates. The fine aggregate used in this investigation was passing through 4.75mm sieve. The grading zone of fine aggregate was zone II as per Indian standard specification. Water is used for preparation of magnetic water is free from suspended particles and chemical substances

### C) PREPARATION OF MAGNETIC WATER

Magnetic water was prepared by passing normal tap water through magnetic water conditioner. Magnetic Water Conditioner is a device which is used to treat water under the influence of magnetic field. The MWC device used in this experimental investigation was made up of two parts as follows.

- Permanent Magnet Instrument
- Electromagnetic Instrument

A high power bar magnet that can produce the magnetic field of around 12000 Gauss was used. This high power magnet is fitted in cylindrical pipe with half inches diameter inlet and outlet facility. The electromagnet is constructed from many coils of wire wrapped around a central iron core. The magnetic field is present only when electrical current is passed through the wire coils.

**D) MIX PROPORTION**

For this investigation, the concrete Grade M25, M30 &M35 for the samples was used. The detailed mix designs of different grads of concrete are given below.

**Table 1.Mix proportion for 1m<sup>3</sup> M25 Concrete**

W/C ratio	Water	Cement	Sand	Aggregate
0.41	231.56 kg	480.87 kg	645.87 kg	1161.44 kg

**Table 2.Mix proportion for 1m<sup>3</sup> M30 concrete**

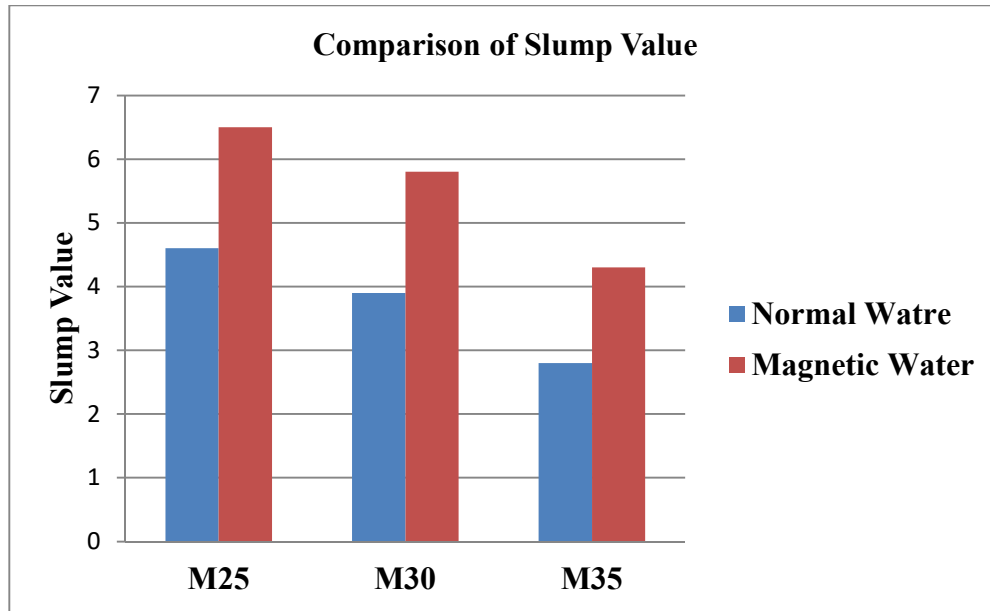
W/C ratio	Water	Cement	Sand	Aggregate
0.40	231.25 kg/m <sup>3</sup>	492.9 kg	639.23 kg	1159.38 kg

**Table 3. Mix proportion for 1m<sup>3</sup> M35 concrete**

W/C ratio	Water	Cement	Sand	Aggregate
0.38	230.78 kg	518.42 kg	624.68g	1152.34g

**3. TEST RESULT****a) Result of Slump cone test**

Sr.no.	Grade of Concrete	Normal Water	Magnetically treated Water	Increase in slump
1	M25	4.6cm	6.5cm	1.9cm
2	M30	3.9cm	5.8cm	1.9cm
3	M35	2.8cm	4.3cm	1.5cm



Graph1. Comparison of Slump Value

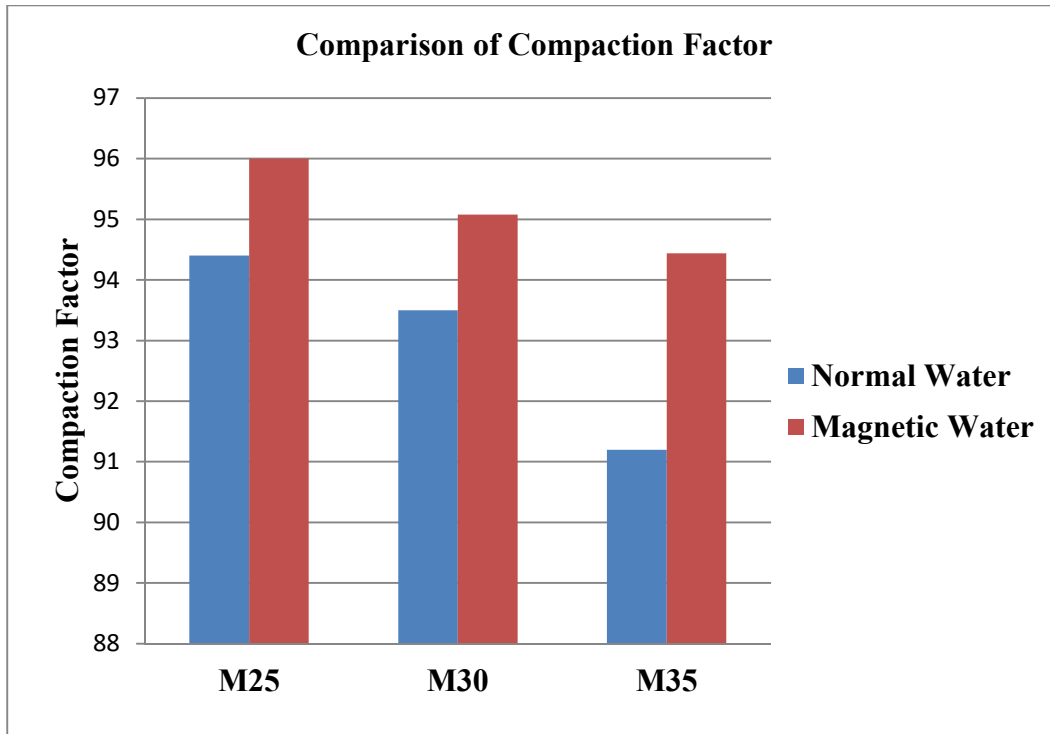
### Discussion

- i. Slump of concrete mix prepared by magnetic water increases so workability of concrete increases if magnetically treated water is used.
- ii. The increasing slump of concrete was less for grade M35

### b) Compaction Factor Test

Table.4.9. Result of Compaction Factor test

Concrete Mix	Normal Water	Magnetically Treated Water	Increase in Compacting Factor
M25	94.40%	96%	1.6%
M30	93.50%	95.08%	1.58%
M35	91.20%	94.44%	3.24%



**Graph2. Comparison of Compaction Factor Test**

## 4. CONCLUSION

### a) Slump

- i. The slump of concrete mix prepared by magnetic water increases, so workability of concrete increases if magnetically treated water is used.
- ii. The increase in slump of concrete was less for grade M35.

### b) Compacting Factor

- i. Compacting factor of concrete mix prepared by magnetic water increases, so workability of concrete increases if magnetically treated water is used.
- ii. More increase in workability was observed in case of m35 grade of concrete as compaction factor of concrete was increased by 3.24%

## 5. REFERENCES

1. ACI Committee 363, 1984. State-of-the-Art Report on High Strength Concrete, ACI Journal, 81, (4): 364-411.
2. ACI Committee Technical Report 93-2011. High Performance Construction Materials and System – an essential Program for America and its Infrastructure, Civil Engineering Foundation, Washington D.C.
3. Al-Bahar, S.K.; S.M. Abdul Salam; A.M. Husain; and H.J. Karam. 2003. Corrosion protected systems for improving concrete performance in arid regions. Proceedings of the ACI- First International Conference, Kuwait.
4. De Silva KS. Studies on magnetic filtration techniques to purify potable water and waste water [Thesis Report]. New Zealand: Massey University, IIST; 2007.
5. Dhir, R.K. 1997. Towards a holistic approach to material selection for high performance concrete. Proceedings of International Workshop on Advances in High Performance Concrete Technology and its Applications, India.