

Retempering of Morter

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Abstract - In case of mortar using cement, the mortar that has stiffened because of evaporation of water from the mortar may be retempered by adding water as frequently as needed to restore the requirements of consistency. But this retempering shall be permitted only within 60 minutes from the time of addition of cement. When the percentage of admixture is increases the workability of mortar and strength increases. But when admixtures percentage more than 0.2 workability increase and strength decreases

Keywords – Flow, Retarder, Super plasticizer and Compressive Strength

I. INTRODUCTION

Retempering is defined as the “Addition of water and remixing of mortar which has lost enough workability to become unplaceble.”In case of mortar using cement, the mortar that has stiffened because of evaporation of water from the mortar may be retempered by adding water as frequently as needed to restore the requirements of consistency. But this retempering shall be permitted only within 60 minutes from the time of addition of cement (1)

Retempering is done on the mortar board by the mason, usually by dribbling water into the mortar pile then reworking with the trowel. This replaces water lost by evaporation. It keeps the mortar plastic so that units can be laid and positioned in it.The characteristic of mortar that describes its ability to hold water is water retentively. When mortar loses its water to fast, it becomes stiff and unworkable.(2)

Water additions to mortar are permitted only when time limits have not been exceeded. When water and cement come into contact, there is a delay before hydration, or chemical combining of cement and water, begins. Masons use time limit to help guide them on mortars acceptability rather than try to guess if mortar is unworkable because water has evaporated or cement hydration has occurred. A general recommendation is to limit a mortars usable life two and one-half hour from introduction of water, but this can be shorter in hot r dry weather. Old mortar should be discarded.

Of course, good practice also means mixing mortar quantities to match the mason’s space and preventing evaporation of moisture from the mortar. This could mean covering the mortar on the board, working at cooler times of the day, or living the mortar in covered tub. Although retempering is allowed, it can affect mortar strength and color and is not the first or only defense against water loss.(3)

II. PROPERTIES OF MATERIALS

Cement: Ordinary Portland Cement 53grade tested according to IS 8112-1989 and the physical properties of the cement tested and results obtained were as follows : Specific surface area $343\text{m}^2/\text{kg}$, Normal consistency 33%, Initial setting time 30 min and final setting time 600 min, Specific gravity 3.15 and Density of cement 3.15 gm/cc . The test done for 53 ordinary Portland cement tested for physical properties was confirmed to IS 8112-1989 for all the above and it was within limit. The initial setting time of cement was more than 200 minutes as specified in standards and the specific surface area and specific gravity gravity obtained was higher.

Sand: sand was sieved using 4.75mm and the fraction passing 4.75mm was used for all experiments. The physical properties were specific gravity and gradation of sand as per IS: 383-1970 tested. The sand belongs to zone –II as per IS: 3831970. The specific gravity of sand is 2.8. Particle Size Distribution of Sand is given in the table. This indicates

that the greater percentage of finer particle of sand as the ability to improve the mortar properties. The percentage fraction obtained from each sieve size was according to IS 383-1970 and there was no silt content in sand.

Particle size	Cumulative % Finer
4.75mm	99.45
2.36mm	96.7
1.18mm	79.9
600micron	45.3
300micron	12.6
150micron	6.35

Water: Drinkable tap water is used in METU Campus which does not contain excessive amount of harmful material for mortar has been used in preparation of the mixture.

Water should have following properties.

pH=6.5-8.5

Portable

Clean and drinkable

Retarder

Rebuild (RCM 225) (Item Code: FIBCON-WR)

Optimum range in water reducing plasticizer is provided by us. We offer this range at very reasonable rate. Our water reducing plasticizer is used for brickwork and plastering. This FIBCON-WR uses Sodium lignosulphonate

Super plasticizer

(RX SOL – 67- 6704 – 210)

(Item Code: FIBCON – 412-N)

We offer this range at much lower rates. Our water reducing and retarding super plasticizer is suitable for large pours mortar.

III. RESEARCH SIGNIFICANCE:

Mortar which is mixed at the site, using normal, mortar (1:3) should arrive at its destination with sufficient workability to enable it to be properly placed on brick or apply on brick. In such circumstances, where there is a significant periods of time between mixing and placing the mortar, there will be a noticeable reduction in the flow of mortar. If for any reason, the placement of the mortar is unduly delayed, then it may stiffen to an unacceptable degree and site staff would normally insist on the rejection of a mortar.

The stiffening of mortar with water reduction and flow is seen with prolonged mixing of mortar. Especially for hot water, the increased rate of hydration and evaporation of water, and in some cases the absorption of water by dry fine aggregates can result in this. In practice generally some water is added to mortar, in order to overcome the effect of flow loss. However, inclusion of extra water may change the water/cement ratio in an increasing direction. This results in lower strength of mortar. Because of this effect of water as a retempering agent, super plasticizer may be used as a retempering agent instead of water which results in retempering without any change in water/cement ratio at the time of addition process.

The object of this study is to determine the effects of using retarder without water as a retempering agent on mortar. An important point in the work that, all the work has taken at an ambient temperature of 40 C.(1)

IV. EXPERIMENTAL INVESTIGATIONS:

The main aim of this experimentation work is to find the effect of addition of retarding admixtures on the properties of retempered mortar. After thoroughly mixing of cement and sand in dry state, the required quantity of water was added in the mix was obtained. This mortar mix was covered with gunny bags for 15 min. The time was

kept, another set of retempered mortar specimens were cast by adding 0.1%, 0.2%, 0.3% retarder and super plasticizer. All the specimens were demoulded and were transferred to curing tank to cure them for 7 days. After 7 days of curing the specimens were tested for their compressive strength as per IS specifications.

For compressive strength test, the cubes of dimensions 50mm X50mmX50mm were cast and were tested under compression testing machine as per IS 516-1957.

Target Mean Strength (7 days) - 37 N/mm

V. RESULTS AND DISCUSSIONS

In the investigation 4 types of mortars were used. The ratio of cement sand was kept constant at 1:3 and other cementations' materials retarder and super plasticizer added to cement mortar by varying their proportions. The composite mortar tried are cement mortar 1:3 this mortars were tested for their flow consistency, strength and elastic properties.

Workability Test:

Workability of fresh mortar mixes were determined by flow test as per UNIVERSITY OF WYOMING. The water cement ratio for casting of mortar in prism, review showed that flow gives maximum bonding and hence maximum compressive strength.

Flow obtained for different proportions mortars shown table no. 1 the mortars has achieved greater flow with less water cement ratio. Due to addition of retarder and super plasticizer cement mortar the specific area of these materials increases the water content and making the mortar more workable within available water content and induces greater flow table spread.

As per IS 2250-1981 masonry mortars cubes were cast and cured and compressive strength was determined in table no 1. The 4 types of mortar (0.0 %, 0.1%, 0.2%, and 0.3%) were cast and cured by immersing them in a water bath and tested for their compressive at 7 days. The results are obtained for saturated compressive strength for all 4 different mortars.

Table No- 1 Compressive Strength and flow of Retempering Mortar

Retempering Time	Percentage retarder	of	Percentage of super plasticizer	Flow	Compressive strength in N/mm ²
0 minutes	--		--	71.42	21.2
30 minutes	--		--	--	--
60 minutes	--		--	--	--
90 minutes	--		--	--	--
0 minutes	0.1		0.1	100	43.78
30 minutes	0.1		0.1	71.42	43.73
60 minutes	0.1		0.1	--	33.20
90 minutes	0.1		0.1	--	26.8
0 minutes	0.2		0.2	128.57	43.78
30 minutes	0.2		0.2	85.71	43.73
60 minutes	0.2		0.2	--	38.07
90 minutes	0.2		0.2	--	27.06
0 minutes	0.3		0.3	157.14	3.00
30 minutes	0.3		0.3	128.57	7.10
60 minutes	0.3		0.3	100	8.20
90 minutes	0.3		0.3	71.42	9.00

VI. CONCLUSION

- When we add retarder and super plasticizer in the mortar, the flow and strength of mortar increases.
 - Without retarder and super plasticizer the required flow is for 0 minute only.
 - When we use 0.1 % retarder and super plasticizer are used, we get the flow and strength upto 30 minutes.
 - When we use 0.2% retarder and super plasticizer we get required flow and strength for retempered mortar.
 - When we use 0.3% retarder and super plasticizer we get required flow upto 90 minutes.
 - When we use 0.3% retarder and super plasticizer, the demoulding time of cube is increases.
- The optimum % of retarder and super plasticizer is 0.2%.

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