황토의 압축강도 특성에 관한 연구

Properties of compressive strength of Ocher

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ABSTRACT

Construction industry is one of the fastest growing sectors in the world. Rapid construction activity and growing demand of houses have lead to the short fall of traditional building materials, such as burnt bricks. It is better to replace the traditional materials by the good quality of building materials with the low cost and durable environment friendly building materials. In order to satisfy that purpose, the researchers need to vary of new and innovative building materials. This paper shows the properties of compressive strength of ocher for unburnt bricks.

***Keywords**: friendly materials, ocher.*

1. Introduction

The materials and technologies chosen for construction must, in addition to functional efficiency, fulfil some or more of the following criterion, for the cause of sustainability and a better quality environment: non endanger bio-reserves and be non-polluting; utilize locally available materials; utilize local skills, manpower and management systems; be accessible to the people; be low in monetary cost.

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Ocher are among the most widely used pigments. They can be traced back to the earliest cave paintings. Ocher can be found in natural form in volcanic regions. There are many variations of ocher: a light, warn tone is Venetian Red, darker, more cool-toned purple versions is called Indian Red, or Caput Mortuum. It is good for environment and our health to replace the burnt ocher bricks by unburnt ocher bricks.

2. Experiment

2.1. Materials

In this research, there are 4 kind of materials was used: soil of weathered granite, burnt ocher, east ocher and binder.

Table 1. Chemical composition of binder

Oxide	SiO_2	Al_2O_3	CaO	Fe_2O_3	MgO	Ig loss
Content(%)	67	18	4	2	4	5

2.2. Mix proportions and compressive strength

Table 2. Mix proportions and compressive strength of ocher

Series	Materials (%)				Compressive strength (MPa)		Series	Materials (%)				Compressive strength (MPa)	
	SWG	BO	EO	B	7days	28days		SWG	BO	EO	B	7days	28days
I-1	15	55	10	20	4.46	4.82	IV-1	20	70	5	5	0.78	0.82
I-2	15	50	10	25	6.13	6.59	IV-2	20	65	5	10	1.70	2.13
I-3	15	45	10	30	7.73	8.17	IV-3	20	60	5	15	2.96	3.10
I-4	15	50	15	20	5.94	6.35	IV-4	20	55	5	20	4.52	4.71
I-5	15	45	15	25	7.10	7.73	IV-5	20	50	5	25	5.11	5.46
I-6	15	40	15	30	9.94	11.13	IV-6	20	45	5	30	5.78	6.55
II-1	25	45	10	20	4.52	4.97	V-1	20	65	10	5	0.83	0.91
II -2	25	40	10	25	5.65	6.00	V-2	20	60	10	10	1.72	2.18
II -3	25	35	10	30	7.01	7.29	V-3	20	55	10	15	3.17	3.30
II -4	25	40	15	20	5.55	6.21	V-4	20	50	10	20	4.72	5.05
II -5	25	35	15	25	7.40	7.81	V-5	20	45	10	25	6.65	7.03

II -6	25	30	15	30	9.49	10.06	V-6	20	40	10	30	8.58	9.33
III-1	30	40	10	20	4.46	4.72	VI-1	20	60	15	5	0.87	0.97
III -2	30	35	10	25	5.49	5.81	VI-2	20	55	15	10	2.16	2.42
III -3	30	30	10	30	6.46	6.79	VI-3	20	50	15	15	3.42	4.10
III -4	30	35	15	20	5.19	5.70	VI-4	20	45	15	20	6.24	7.01
III -5	30	30	15	25	6.74	7.14	VI-5	20	40	15	25	8.37	9.21
III -6	30	25	15	30	8.03	8.68	VI-6	20	35	15	30	11.30	13.46

Water ratio is 20% for mix proportions.

Legend: SWG: soil of weathered granite, BO: burnt ocher, EO: east ocher and B: binder.

2.3. Results and discousion

In this research, we used KS F 2329 to make the specimen for compression test. The specimens were made cylinder 50 mm diameter and 100 mm height for compressive strength.

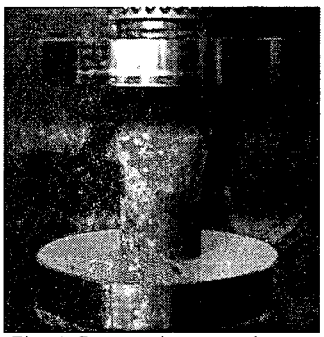

Fig. 1 Compressive strength test

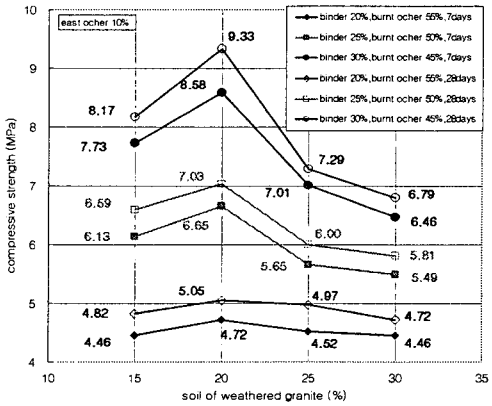

Fig. 2 Compressive strength with 10% east ocher

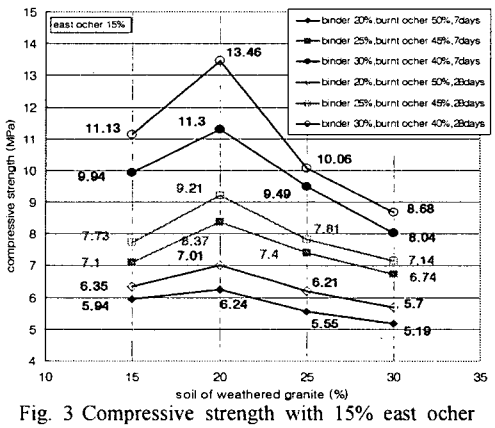

Fig. 3 Compressive strength with 15% east ocher

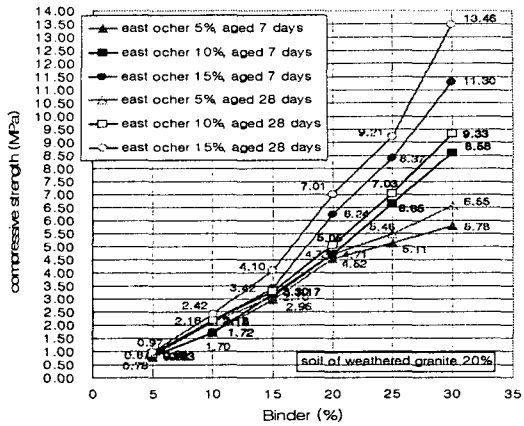

Fig. 4 Compressive strength with 20% soil of weathered granite

From series I ~ VI, when the percentage of soil of weathered granite is 20%. the compressive strength of ocher is higher (fig. 2. 3) than the other percentages of soil of weathered granite because soil of weathered granite is bigger than other components in mix proportions. so that. if it is lower than 20%. it is not enough for strength, but if it is more than 20%, it is not enough fine binder for covering the soil of weathered granite. When the percentage of soil of weathered granite was fixed 20% and the percentage of east ocher was 15%. the compressive strength of series VI-6 is 13.46 MPa (Table 2. fig. 4). If we want both strength and workability, series VI-5 (table 2. fig. 4) is the best mix proportions with the water ratio is 20%. We can produce ocher unburnt bricks with economical effection if we compare to compressive strength of clay bricks (table 3). If we make the specimens with compressing method, we can reduce the water ratio lower than 10% and the compressive strength will be increased.

Table 3. Compressive strength of clay bricks (KS L 4201-1997)

Kind of clay bricks	Type 1	Type 2	Type 3
Compressive strength (MPa)	20.59	15.69	10.78

3. Conclusion

- The strength of ocher with the good mix proportion can be made unburnt bricks.
- The compressive strength of ocher bricks is highest with 20% soil of weathered granite.
- The compressive strength of ocher will be increase if we reduce the water ratio lower than 20%.

Reference

1. 한국산업규격 KS F 2329, KS L 4201

2. ASTM D2166-00. p. 202-207