Applied Mechanics and Materials
ISSN: 1662-7482, Vols. 584-586, pp 1188-1191
doi:10.4028/www.scientific.net/AMM.584-586.1188

Submitted: 2014-04-30
Accepted: 2014-05-10
Online: 2014-07-04

Experimental Study on Manufacturing Environmental Protection Baking Free Brick of Waste Concrete

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Key words：waste concrete; baking—free brick; mixing ratio

Abstract：This paper test the strength intensity, water absorption property of 10 baking—free bricks using the matrix cementing component in waster concrete as the material, studies the effect of m~ing ratio and maintenance time on pmpe~y to get the best mKing ratio of this kind of brick．It also analyzes the intension resources of this brick．

Introduction

In recent years, the rapid development of the building industry has brought rapid development of China's urbanization, a large number of buildings need to be removed, re design, planning and construction. A large number of abandoned concrete produced waste concrete, the construction of new annual dismantling of waste concrete and concrete mixing plant, concrete testing center and other emissions. According to statistics, China's annual production and construction related waste in the l million T, estimated that by 2020 more than 600000000 of T, but the recovery rate is low, mainly in the accumulation of landfill. At the same time, China's building materials industry is also facing the disorderly exploitation, resource scarcity and contradiction. Thus making full use of the waste concrete is not only conducive to Protect environment, also can reduce consumption of fossil resources and dependence. Based on the matrix bonding component in waste concrete as raw material made of unburned brick, effects of mixture ratio, curing time rate on the mechanical properties, water absorption strength, in order to get the best utilization effect.

Experimental study

Baking free brick is composed of mechanical compaction, sintering, not without steaming a new building material feed, the main raw material is clay, slag, waste concrete matrix cementing component (MCC), cement, gypsum, lime. In this paper the preparation of specimens are shown in Table 1

Table 1 Specimen preparation

No.	Clay	MCC	Slag	Cement	Gypsum	Quick lime
1	15	15	45	5	4	15
2	20	20	35	5	4	15
3	25	25	25	5	4	15

4	30	30	15	5	4	15
5	35	35	5	5	4	15
6	15	15	45	5	4	10
7	20	20	35	5	4	10
8	25	25	25	5	4	10
9	30	30	15	5	4	10
10	35	35	5	5	4	10

Process the production of unburned brick as the main material are: grinding, digestion, then mix all the ingredients together, mixing with water, the water solid ratio is 15%, the pressure of 20MPa and pressed into the specifications for the bricks from 240 × 115 × 53mm reference "method of fly ash brick" Jc 239-91. At a temperature of 20 ± 3 ℃, curing box maintenance to the specified age humidity is higher than 90%, the mechanical properties and water absorption rate test.

results of analysis

Baking free brick different ratio in quality, strength, water absorption rate of different curing age changes as shown in Table 2, pressing molding quality of each baking free brick for 2850kg. Baking free brick quality change smaller, more excellent performance. We can see from table 2, sample 2, 3, 8 quality changes; different mix ratio of compressive strength of unburned brick with curing time increasing, the specimen compressive strength of 6, 7, 8 of the highest; with different water absorbent baking free brick than the rate of change with the increase of curing time and increases and decreases, 6, 7, 8 sample water absorption rate is low. Considering the properties of samples, 8 good, accord with the requirements of building brick.

Table 2 With different quality, water absorption ratio of the intensity of unburned brick curing period, the rate of change

Age	NO.	1	2	3	4	5	6	7	8	9	10
	Weight / kg	2740	2815	2880	2880	2870	2840	2850	2840	2805	2850
0d	Strength / mp	0.4	0.9	2.0	0.8	1.3	5.4	3.8	5.0	3.2	3.5
	Water absorption rate / %	38.5	37.6	33	36.6	35.5	20.0	27.7	25.9	26.4	26.5
	Weight / kg	2710	2780	2860	2850	2865	2825	2850	2810	2815	2840
7d	Strength / mp	1.0	1.5	2.1	1.8	2	11.6	7.4	8.8	5.2	6.2
	Water absorption rate / %	38.7	33.5	31.7	36.5	35.6	24.5	27.1	26	27.0	26.9
	Weight / kg	2760	2785	2855	2830	2890	2880	2860	2815	2830	2805
14d	Strength / mp	1.5	2.5	3	2.0	2.4	12	11.4	11.3	5.2	6.8
	Water absorption rate / %	34.3	32.5	31.2	34.8	37.2	27.2	27.2	26.5	28.5	28.4
	Weight / kg	2855	2880	2890	2790	3060	2985	3010	2880	2925	2965
28d	Strength / mp	3.0	4.0	4.4	2.0	2.4	16.8	13.3	13.8	5.2	6.8
	Water absorption rate / %	31.8	30.5	30	34.8	38	28.0	28.2	26.0	27.9	29.3

Unburned brick strength source

3.1 mechanical action

The early strength of unburned brick is obtained in the compression molding process. Not only the unburned brick molding has a certain strength, and the particles of raw materials tight contact between the physical and chemical actions between material particles can effectively, provide the necessary conditions for the long-term strength growth. According to the study that, under the same other conditions, increase the intensity of unburned brick molding pressure and improve the. If not the role of high-pressure molding, even with cement and lime, nor the formation of high strength.

3.2 hydration reaction

In the production and processing of raw materials in slag unburned brick, contains a large number of activated alumina and activated silica, hydration reaction with calcium hydroxide in the additive effect, similar to that generated the cement hydration products of the cement material, i.e. water acid calcium silicate, aluminum, hydration, the hydration products interleaving lap together to make unburned transfer intensity.

3.3 non hydrated cement particles two hydration

Cement contains a number of coarse particles larger, because the hydration products formed by these particles on the surface layer of certain thickness will prevent moisture into the internal granule, not water, so their hydration to a certain extent will stop. When the matrix bonding component in waste concrete as material and clinker cement mixing and grinding, in great crushing force, not water those particles due to external water layer has been stripped and exposed, which further refined into small particles, can be re play the hydration activity. At the same time, the non hydrated cement particles, two water and cement clinker with the same hydraulic, equivalent to an increase of the clinker content in cement, thereby reducing the amount of cement, reduce the cost.

3.4 aggregate function

Baking free brick component in the matrix cementing component containing fine sand and fine aggregate as aggregate function in the brick, can improve the strength of brick, reduce shrinkage, prevent brick delamination, increase density, so as to improve the strength and durability of brick. At the same time, but also saves cement dosage, reducing the cost.

Conclusion

Baking free brick in the production process, without the need for a sintering does not need steam pressure, thus greatly reducing costs. With the waste concrete as the main raw material for the production of unburned brick making full use of the waste concrete, reduce the cost of the product, the protection of resources and environment.

Using the matrix bonding component in waste concrete as main raw materials, coupled with the clay, slag, lime, cement and gypsum, by compression molding method can produce unburned

transfer. According to the test data, quality change, strength, water absorption properties are the best when the ratio of clay 25%, NCC25% 25%, slag, cement 5%, 4% gypsum, lime 10%.

Containing unburned brick raw slag in a large number of active silica and alumina and calcium hydroxide to live, their hydration reaction of the hydrated calcium silicate, calcium aluminate hydrate can improve the strength of brick. At the same time, the aggregate effect of MCC not hydrated cement particles two hydration and MCC containing fine sand and fine aggregate in the brick also will continue to increase the strength of brick.

Acknowledgements

Foundation item: Hebei Institute of Architecture and Civil Engineering 2013 annual research fund project (project number: Q-201314)

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