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Replacing GB/T 12957-2005

Test method for the activity of industrial waste slag used as a cement addition

用于水泥混合材的工业废渣活性试验方法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document replaces GB/T 12957-2005.Compared with the GB/T 12957-2005 standard, apart from structural adjustments and editorial changes, the main... The technological changes are as follows:

a) A method summary has been added (see Chapter 4);

b) The fineness requirements for industrial waste residue have been revised (see 5.1,.2005 edition 3.1);

c) The technical requirements for natural gypsum have been revised (see 5.2,.2005 edition 3.2);

d) The technical requirements for silicate cement have been revised (see 5.3,.2005 edition 3.3);

e) The requirements for test water have been changed (see 5.4,.2005 edition 3.4);

f) Increased requirements for curing chamber and laboratory conditions (see

6.1.3.2 and 6.1.4);

g) The sample requirements and result interpretation for the potential water hardness test have been changed (see

6.1.2 and 6.1.6,

5.1.5 in the.2005 edition);

h) A water hardness test has been added (see 6.2);

i) An activity assessment has been added (see Chapter 7). Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed by the China Building Materials Federation. This document is under the jurisdiction of the National Cement Standardization Technical Committee (SAC/TC184). This document was drafted by: China Building Materials Academy Co., Ltd., and the Second Engineering Co., Ltd. of China Railway 25th Bureau Group. Jiangxi Provincial Institute of Quality and Standardization, Changda Municipal Engineering (Guangdong) Co., Ltd., Guangdong Shengrui Technology Co., Ltd., Yunnan Provincial Construction Materials Product Quality Inspection and Research Institute, Henan Jiaotong University Engineering Technology Group Co., Ltd., Shenzhen University, Chengdu University of Technology, Zhejiang Huiheyuan Environment Technology Co., Ltd., Northeastern University, Sichuan Road & Bridge Engineering Co., Ltd., Beijing University of Technology, Qingdao University of Technology, Three Gorges University, Ninghua County Construction Engineering Quality and Safety Service Center, Ningxia Transportation Science Research Institute Co., Ltd., Mengzi Yingzhou Cement Co., Ltd., Sichuan Chuanqiao Engineering Testing and Inspection Co., Ltd., Hubei Provincial Waterway Engineering Co., Ltd., Northeast Electric Power University, Shandong Shunxing Cement Co., Ltd. Company, Wuhan University of Technology, Guangxi University, Sichuan Highway and Bridge Construction Group Co., Ltd., Beijing Building Materials Science Research Institute Co., Ltd. China Railway Engineering Design & Consulting Group Co., Ltd., Guizhou Construction Vocational and Technical College, Huzhou Xinkaiyuan Crushed Stone Co., Ltd., and China Communications Construction First Highway Engineering Bureau Civil Engineering Engineering and Construction Research Institute Co., Ltd., China Railway 18th Bureau Group Construction and Installation Engineering Co., Ltd., Fujian Longyan Fangyuan Cement Products Co., Ltd. China Coal Technology & Engineering Mining Research Institute Co., Ltd., Feiyi Co., Ltd., Shanxi Shunwang Construction Engineering Co., Ltd., Ningxia Jiaojian Transportation Technology Research Institute Research Institute Co., Ltd., Jiangxi Jiuling Lithium Industry Co., Ltd., China Railway Seventh Group Xi'an Railway Engineering Co., Ltd., Ansteel Green Resources Technology Limited Liability Company, Guangdong Tapai Group Co., Ltd., Jingye Steel Co., Ltd., Beijing Zhongtian Standard Technology Research Institute Group Co., Ltd. company. The main drafters of this document are. Wang Xin, Qiu Jiayang, Guan Haijun, Qin Zhijun, Zhang Jinshan, Shao Jinggan, Liu Hewen, Zheng Mingming, Lei Ningning, and Cheng Hao. Du Yong, Liu Chen, Zheng Xu, Gu Xiaowei, Yan Feng, Tang Xiaoping, Zhang Jie, Tan Yunzhi, Deng Huafeng, Li Haibing, Cui Suping, Li Bangwei, Wu Feng, Fang Guohao, Bao Jiuwen, Yu Chenyun, Dong Yong, Fang Jian, Tian Zhijin, Geng Hairong, Qian Weimin, Wang Dehong, Guo Lei, Qi Lianyong, Shen Yonglin, Ding Sheng, Zhang Zhijuan, Jiang Shuangquan Zhou Mingkai, Sang Hongshan, Li Zhengji, Xiao Jinjun, Li Shisong, Ju Xiaoxia, Zhang Xiao, Bao Shenxu, Zhan Wenbing, Pan Meichen, Zeng Zheng, Wang

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5 Experimental Materials

5.1 Industrial waste residue Take 5 kg of representative industrial waste residue, dry it at (100±5)°C until the moisture content is less than 1%, and then grind it finely using a laboratory small mill. The residue on a 45μm square-hole sieve is within the range of (10±5)%. Grinding aids conforming to GB/T 26748 can be added during the sample grinding process, and their... The dosage should be less than 0.5%.

5.2 Natural Gypsum Gypsum conforming to Class G or Class M mixed gypsum as specified in GB/T 5483, ground to a fineness such that the residue on a 45μm square-hole sieve is no more than 30%.

5.3 Silicate Cement Portland cement meeting GB 175 requirements, with a 28-day compressive strength of (55.0±5) MPa and a specific surface area of (350±10) m^2/kg. The sulfate sulfur trioxide content (mass fraction) is (2.5±0.5)%, and the alkali content (mass fraction) is in the range of 0.5%~0.9%.

5.4 Test water Water should meet the requirements of Grade III or above as specified in GB/T 6682.

6.1 Potential water hardness test

6.1.1 Method Overview Materials with potential hydraulic properties can harden both in moist air and continue to harden in water. This was demonstrated by observing industrial waste mixed with gypsum. The hardening behavior of the mixture with water in moist air and water is used to evaluate its potential hydraulic properties.

6.1.2 Test Samples The industrial waste residue powder and gypsum dihydrate powder are mixed evenly, and the total content of sulfate and sulfur trioxide in the mixed sample should be controlled at (7.5±0.2)%.

6.1.3 Instruments and Equipment

6.1.3.1 Cement paste mixer It should comply with the requirements of JC/T 729.

6.1.3.2 Curing Box It should comply with the requirements of JC/T 959.

6.1.4 Laboratory Conditions The temperature and humidity of the laboratory shall comply with the relevant provisions of GB/T 17671.

6.1.5 Test Procedure Weigh (300±1) g of the test sample, prepare a paste test cake

according to the standard consistency water content determined by GB/T 1346 method, and place it in a warm environment. After curing in a curing chamber at (20±1)°C and relative humidity greater than 90% for 7 days, the cakes were immersed in water at (20±1)°C for 3 days. The results were then observed in the water-soaked cakes. shape.

6.1.6 Result Evaluation If the test cake remains intact and without obvious cracks after curing in the curing chamber, and its edges remain clear, intact, and not scattered after curing in water for 3 days, then it is considered acceptable. It has potential hydraulic properties. If the test cake becomes hard after being cured in water, it indicates that it has good potential hydraulic properties.

6.2 Hydraulicity Test

6.2.1 Method Overview Hydraulic materials should be able to harden in moist air without the addition of external activators, and also continue to harden in water. This can be achieved by observing industrial waste... The hardening properties of the slag and water after uniform mixing are evaluated by assessing their hardening in moist air and water.

6.2.2 Test Samples Take the fine powder of industrial waste residue prepared according to the requirements of 5.1.

6.2.3 Instruments and equipment, laboratory conditions, and testing procedures Same requirements as

6.2.4 Result Evaluation The test cake should have a complete surface without cracks during curing in the curing chamber, and its edges should remain clear, intact, and not dispersed after 3 days of curing in water. If so, it is considered acceptable. It has hydraulic properties.

6.3 Volcanic Ash Test In accordance with the relevant provisions of GB/T 2847. 6.4 28-day compressive strength ratio test

6.4.1 Method Overview The activity of industrial waste was tested by comparing the compressive strength ratio of cement mortar before and after the addition of industrial waste.

6.4.2 Sample

6.4.2.1 Test Sample It is made by uniformly mixing silicate cement meeting the requirements of

5.3 and fine industrial waste powder meeting the requirements of

5.1 in a mass ratio of 7.3. By adding an appropriate amount of gypsum powder that meets the requirements of 5.2, the content of sulfate-type SO3 in the test sample was adjusted to match the sulfate-type sulfur trioxide content in the comparison cement. The quantities should be basically the same (range not greater than 0.3%), and the samples should be thoroughly mixed.