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混凝土中机制砂的配合比设计与应用

吴茂胜

, 010070

摘 要:

≤25

2.6 3.2 4 6 70%

关键词: ; ; ; ;

中图法分类号: TU528.56 **文献标识码:** A **文章编号:** 1000-2324(2015)05-0730-04

The Design and Application of Machine-made Sand Proportion in Concrete

WU Mao-sheng

Transportation Institute of Inner Mongolia University, Hohhot 010070, *China*

Abstract: Machine-made sand has been widely applied in concrete engineering with the environmental protection and sustainable concept in mind. This paper analyzed the mechanical properties of machine -made sand in concrete based on the experimental phenomena and data. the results showed that the control parameters were crush indexes which were less than or equal to 25%, the fineness modulus at 2.6 ~ 3.2, stone powder content in 4 ~ 6%, sand content was more than 70%. The manufactured process took up wet process production. The design of machine-made sand in concrete could fully play a role of admixture to provide a reference for mechanism of sand concrete ratio design and application.

Keywords: The machine-made sand; concrete; proportion; experimental study; engineering project

Hudson BP

[1-3] 5~10%

[4] 6%~12%

[5]

Bonavetti

[7-9] [10] (2%~6%)

1 机制砂试验研究

1.1 材 料

1.1.1 水泥 P.O42.5 3100 kg/m^3

1.1.2 机制砂 2690 kg/m^3 1570 kg/m^3 11% 4.7% 2.0

1.1.3 细山砂 2620 kg/m^3 1390 kg/m^3 6.5% 1.5

1.1.4 碎 石 2750 kg/m^3 1450 kg/m^3 3.3% 5.7

1.1.5 粉煤灰 2320 kg/m^3 930 kg/m^3

1.1.6 膨胀剂 UEA 3000 kg/m^3 8 14

1.1.7 外加剂 18.4

1.2 配合比计算

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作者简介: (1969-), , , , , , . E-mail:leolen123@163.com

2.5 X

X=0.68 0.70 3:7

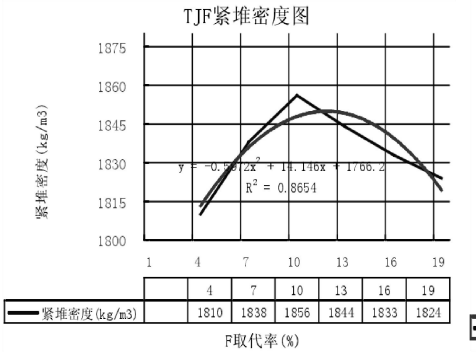

图 1 α值计算图

Fig.1 The α value calculation diagram

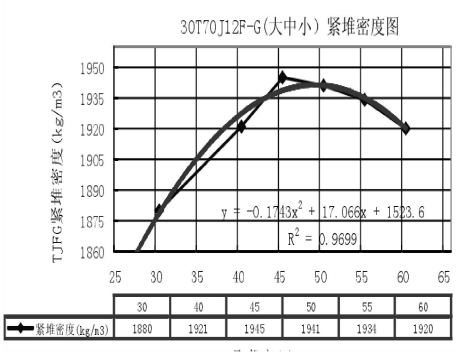

图 2 β 值计算图

Fig.2 The β value calculation diagram

1 F α 11.26% 12

表 1 粉煤灰/砂取代石子试验记录

Table 1 Test records of fly ash / sand in displace of gravel

TJF/(TJF+G)	G	TJF	Density
30%	3000 g	1285.6 g	1870 g/cm3
41%	3000 g	2000 g	1897 g/cm3
44%	3000 g	2543.5 g	1944 g/cm3
50%	3000 g	3000 g	1940 g/cm3
55%	3000 g	3666 g	1933 g/cm3
60%	3000 g	4500 g	1910 g/cm3

2 : x=49.0 1941 kg/m³ β 49.0%

$f_{cl} = 45 + 1.645 * 6 = 54.9 Mpa$ W_G =1941× 1-0.49 kg/m³=990 kg/m³ TJF=951 kg/m³ α 12 W_F =951×0.12 114 kg/m³ : W_H =837 kg/m³ : =7:3 : W_T =251 kg/m³ : W_J 586 kg/m³ : V_v =0.275 V_p =n V_v =0.344 n 1.25 V_{agg} =1- n V_v =0.656 0.3×2610+0.7×2680 kg/m³=2660 kg/m³ 0.32 0.12 :C=425 kg/m³ :P=58 kg/m³ :W=188 kg/m³

0.8%,

15 :W=189×(1-0.15) kg/m³=160 kg/m³ :160/0.31 104=396 kg/m³ :P=396×0.12=47.2 kg/m³ :C=396×0.88=348 kg/m³ :396×0.008=3.18 kg/m³ 2426 kg/m³

W_H+W_F+W_G=1869 kg/m³ W_H:W_F:W_G=7.35:1:8.69 : W_H =808 kg/m³ : W_F =110 kg/m³ : W_G =956 kg/m³ : W_T =242 kg/m³ W_J 566 kg/m³ : : : : : : : : =349:242: 566:956:160:110:47.6:3.17

2 机制砂混凝土在在铁路工程中的应用

,

2.1 工程背景

1142 km 2001 6 29 2006 7
7.820×10^7 m³ 330.9

2.2 施工情况

5 40 mm : : :
: : 331:777:1271:184:46.8:3.84

15
15 s 20 s

2.3 试验数据

22

表 2 抗折试验结果

Table 2 The results of anti-fracture in test

Projects	Anti-fracture			
	Groups	Maxi	Mini	Average
	10	7.3	50.6	57.3
	12	7.6	48.2	56.4

表 3 抗压试验结果

Table 3 The results of anti-press in test

Projects	Anti-fracture			
	Groups	Maxi	Mini	Average
	10	7.3	5.7	6.8
	12	7.6	5.2	6.6

2 3

4 结 论

1

2
≤25 2.6 3.2 4 6 70%
3

参考文献

[1] Marek MCR. Importance of Fine Aggregate Shape and Grading on Properties of Concrete// International Center for Aggregates Research[C]. USA: 3rd annual symposium, 1995
[2] Hudson BP. Manufactured Sand for Concrete[C]. Austin.Texas:5th ICAR Symposium, 1997
[3] Nichols FP. Manufactured Sand and Crushed Stone in Portland Cement Concrete[C]. USA:Concrete International,1982
[4] . [J]. ,1997,12( ):93-96
[5] . [J]. ,1989,(2):19-26
[6] Bonavetti VL, Donza H, Rahhal VF. High strength concrete with limestone filler cements[C]. USA:American Concrete Institute, 1999:567-580
[7] Gutteridge WA, Dalziel JA. Filler cement: The effect of the secondary component on the hydration of Portland cement: Part 1. A fine non-hydraulic filler[J]. Cement Concrete Research, 1990,20(5):778-782
[8] Ingram K, Daugherty K. Limestone additions to Portland cement: uptake, chemistry and effects[C]. New Delhi, India: Proc. 9th Int. Congr. Chem. Cem, 1992:181-186
[9] Soroka I, Stern N. Calcareous fillers and the compressive strength of Portland cement[J]. Cem Concr Res, 1976,6(3):367-376
[10] , , , . [J]. ,2000(4):46-50

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参考文献

[1] . (2012- 2020)[J]. ,2013,2:2-5
[2] , , , . [M]. : ,1993,7:137-139
[3] , , , . [J]. ,2009,11:30-31
[4] . [D]. : ,2004
[5] , , . [J]. ,2012,28(11):71-74
[6] , , , . [J]. ,2012,40(4):156-158
[7] , , , . [J]. ,2009,17(31):18-21
[8] . [D]. : ,2010
[9] , , , . [J]. ( ),2010,7( ):48-49
[10] . [D]. : ,2005
[11] , , , . [J]. ,2005,9(27):16-18
[12] , , , . 6 [J]. ,2011,21(47):6-11
[13] . [D]. : ,2004
[14] . 308 [D]. : ,2011
[15] , , , . [J]. ,2011,23(9):1592-1599
[16] . [D]. : ,2010
[17] , , , . [J]. ,2010,19(6):38-43
[18] . [D]. : ,2005
[19] . MC1R [D]. : ,2009