

Strength and Durability of Flowing Concrete using Daracem® 19

Introduction

A series of tests was conducted to evaluate the durability of flowing, superplasticized concrete. Three separate loads of concrete were produced with various addition rates of Daracem® 19 to produce concrete with slumps ranging from 178 mm to 254 mm (7 in. to 10 in.). Standard tests were performed, including air content, slump and unit weight. Two beams were cast from each mix for freeze-thaw durability analysis (ASTM Method C666, Procedure B, Rapid Freezing in Air and Thawing in Water).

The test results show that Daracem 19 provided compressive strengths 2 to 5 MPa (250 to 700 psi) higher than the reference mix even at equal water-cement ratio. Thus, Daracem 19 provides a double benefit of increased workability (higher slumps), coupled with higher strengths, at the same cement content. This is due to the greatly improved dispersion of cement provided by the Daracem 19. The data also shows relative durability factors 95% and more of the reference mix after 300 freeze-thaw cycles.

Summary

To summarize, flowing concrete can be made which gives an increase in the degree of workability, coupled with higher compressive strengths, as well as proper freeze-thaw durability.

Flowing Concrete with Daracem 19, Summary of Test Data

Test Designation	A	B	C
Cement, kg/m ³ (lbs/yd ³)	335 (564)	335 (564)	335 (564)
Sand, kg/m ³ (lbs/yd ³)	783 (1320)	783 (1320)	783 (1320)
Coarse agg, kg/m ³ (lbs/yd ³)	1038 (1750)	1038 (1750)	1038 (1750)
Water, kg/m ³ (lbs/yd ³)	177 (298)	174 (293)	177 (299)
W/C ratio	0.53	0.52	0.53
Daravair®, mL/m ³ (oz/yd ³)	155 (4.0)	164 (4.25)	164 (4.25)

Before Daracem 19

Air, %	6.0	6.5	7.0
Slump, mm (in.)	121 (4.75)	114 (4.50)	127 (5.00)
Unit weight, kg/m ³ (lbs/ft ³)	2307 (144.0)	2300 (143.6)	2281 (142.4)
Yield, m ³ (ft ³)	1.01 (27.31)	1.02 (27.35)	1.02 (27.62)

After Daracem 19

Amount of Daracem 19 added, mL/100 kg (oz/100 lbs)	0.0 (0.0)	456 (7.0)	652 (10.0)
Air, %	N/T	6.2	6.2
Slump, mm (in.)	N/T	178 (7.00)	254 (10.00)
Temperature, °C (°F)	24 (76)	26 (79)	26 (78)
Unit weight, kg/m ³ (lbs/ft ³)	N/T	2320 (144.8)	2320 (144.8)
Yield, m ³ (ft ³)	N/T	1.00 (27.12)	1.01 (27.16)

Compressive Strength, MPa (psi)

3 day % of reference	19.5 (2830) 100	23.2 (3370) 119	23.0 (3340) 118
7 day % of reference	24.6 (3570) 100	27.4 (3970) 111	26.4 (3830) 107
28 day % of reference	33.7 (4890) 100	37.2 (5390) 107	37.5 (5440) 109
56 day % of reference	37.7 (5460) 100	40.2 (5830) 107	41.0 (5950) 109

Freeze-Thaw Durability

Durability factor	98.5	95.0	95.0
% of reference	100	96.0	96.0

gcpat.com | North American Customer Service: 1-877-423-6491

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for consideration, investigation and verification by the user, but we do not warrant the results to be obtained. Please read all statements, recommendations and suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation, or suggestion is intended for any use that would infringe any patent, copyright, or other third party right.

Strux is a trademark, which may be registered in the United States and/or other countries, of GCP Applied Technologies Inc. This trademark list has been compiled using available published information as of the publication date and may not accurately reflect current trademark ownership or status.

© Copyright 2016 GCP Applied Technologies Inc. All rights reserved.

GCP Applied Technologies Inc., 62 Whittemore Avenue, Cambridge, MA 02140 USA.

In Canada, 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

GCP0083 STRUX-46-1016



gcp applied technologies