

William E. Dailey Precast LLC
295 Airport Road
Shaftsbury, VT 05262
802-442-4418

Date : 6/4/2013

Mix ID # 53

Compressive Strength :

PSI	MPA
8000	55.2

Job/PO Number : 537304

Project : Plymouth, VT - Bridge 8 NEXT Beams

Concrete Source : Dailey Precast

Construction Type: Precast

Placement : Mixer Truck

	Kg/ m3	lbs / cu.yd	Density
Cement : Lafarge SF Blend	449	757	3.15
Pozzolan : Class F Flyash	79	134	2.3
Pozzolan : None	0	0	
Sand : W.E Dailey Natural	747	1259	2.7
Stone : W.E Dailey #67	900	1518	2.73
Water : Dailey Well	143.3	242	1
	mL/m ³	oz/yd ³	
HRWR : Glenium 3400	3520	91	
AIR : MB-AE90	309	8	
Corrosion : Rheocrete CNI	14853	384	
Retarder : Pozzololith 100XR	0	0	

Design Air: 6.0%

Unit Weight : 144 lb/cu.ft. (Approximate)

Water / Cement Ratio : 0.30 (0.44 Max.)

Air Spec : 5.0%-9.0%

Slump / Spread : Not more than 29"

ADMIXTURE NOTE:

The amount and type of water reducing admixtures may vary slightly from day to day depending on allowable variations in raw materials (e.g., moisture content, temperature, gradations, etc.) Variations in admixtures are made to maintain a favorable water cement ratio while maintaining a workable mixture. Therefore when there is an increase in the high range water reducer there is a corresponding decrease in the amount of water required. This in turn increases slightly the amount of sand and stone required to maintain a 1.0 cubic yard yield.

Casting Date	Lot#	Mix ID	28 Day Strength (psi)	28 Day Average Strength (psi)	ACI 318 (5.6.3.3)
3/19/2013	21403	53	12204	12346	12924
			12487		
			12209		
			13617		
			13699		
			13330		
			13162		
4/2/2013	21461	53	12444	12803	11591
			10683		
			11048		
			10954		
4/9/2013	21490	53	11413	10923	10790
			10773		
			11073		
			10854		
			10891		
			10786		
			10928		
4/18/2013	21518	53	10507	10555	10811
			10603		
			10954		
			10912		
			11117		
			10869		
			10449		
7/12/2012	20249	53	10449	10965	10933
			11481		
			11426		
			11474		
			10662		
			11521		
			11249		
7/16/2012	20289	53	9470	10360	10515
			10444		
			10153		
			11308		
7/19/2012	20311	53	9861	11032	12119
			10996		
			11068		
			12885		
7/23/2012	20337	53	12596	12741	12452
			12685		
			12584		
			12087		
7/25/2012	20355	53	12483	12030	11603
			11976		
			12084		
			11457		
7/27/2012	20375	53	11837	11647	11443
			10978		
			11133		
			11414		
7/31/2012	20390	53	11288	11549	11611
			11448		
			11650		
			12118		
8/2/2012	20408	53	12118	11560	11844
			11002		
			11923		
			11723		
8/7/2013	20430	53	11522	11723	11449
			12198		
			12250		
			11299		
8/10/2013	20448	53	12301	11273	
			10388		
			10375		
			10362		
			10473		
			12072		
			11812		

Average (f'cr): 11550
 St. Dev. (s): 896
 Mod. Factor: 1.00 (Table 5.3.1.2)

f'cr=f'c+1.34s f'c= 10350

f'cr=.9*f'c+2.33s f'c= 9231



QC Report

PECKHAM

7252

GLENVILLE, NY - GLENRIDGE RD BRIDGE

Strength Test Records # 1

Casting Date	Location	Lot#	Mix ID	VSI	Air Temp	Conc. Temp	Slump/Spread	Unit Weight	Air Content	Strength At Release	7 Day Strength	28 Day Strength	Required 28 Day Strength	Product	Label	ID
03/19/2013	KC20	21403	53	0	60	75	22.5	144.08	6.4	8378	9497	12204		BRB	02-002	2
					60	75	22.5	144.08	6.4	7629	9798	12487				
03/26/2013	KC20	21432	53	0	60	76	23	143.92	6.4	7539	10145	12209		BRB	02-003	3
					60	74	22	146.32	5.5	7335	10264	13617		BRB	02-004	4
					61	76	23	146.62	5.5	8797	10289	13699				
					61	76	23	146.62	5.5	8367	10414	13330				
					60	74	22	146.32	5.5	6920	10731	13162				
					60	76	23	143.92	6.4	6800	10763	12444				
04/02/2013	KC20	21461	53	0	61	66	26	142.72	5.6	6963	8628	10683		BRB	02-005	5
					60	80	22	139.68	6.8	7294	8790	11413		BRB	02-006	6
					60	80	20	142.4	6.2	7477	8858	10773				
					60	80	22	139.68	6.8	7140	9083	11073				
					60	80	20	142.4	6.2	7262	9224	10854				
					61	66	26	142.72	5.6	7134	9260	10928				
04/09/2013	KC20	21490	53	0	63	82	22	142.48	6.2	7842	9829	10507		BRB	01-001	1
					63	78	23.5	142.72	7.3	7589	9962	10603		BRB	02-007	7
					63	78	23.5	142.72	7.3	8856	9975	10954				
					63	82	22	142.48	6.2	8007	10032	10869				
					63	82	23.5	143.36	6.4	7752	10695	10449				
					63	82	23.5	143.36	6.4	8261	10900	11481				
04/18/2013	KC20	21518	53	0	63	77	21	140.4	7.1	7385	9174	11426		BRB	02-008	8
					63	77	21	140.4	7.1	7489	9302	11521		BRB	03-009	9
					63	78	22.5	143.52	6.5	8379	10622	11249				
					63	78	22.5	145.6	6.7	8712	10966	9470				
					63	78	22.5	143.52	6.5	8349	11082	10444				
					63	78	22.5	145.6	6.7	8711	11177	9861				



PECKHAM

7277

QC Report

PORTSMOUTH MEMORIAL BRIDGE

53

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Page 1 / 1

Strength Test Records #2

Casting Date	Location	Lot#	Mix ID	VSI	Air Temp	Conc. Temp	Slump/Spread	Unit Weight	Air Content	Strength At Release	7 Day Strength	28 Day Strength	Required 28 Day Strength	Product	Label	ID
07/12/2012	KC20	20249	53	0	81	83	25.5	148.4	4.9	8291	10525	10996		NXTBM	NB-1	1
					81	88	25.5	149.76	4.2	8749	10980	11068		NXTBM	NB-2-1	2
07/16/2012	KC20	20289	53	0	79	82	24	146.4	5.4	7254	10262	12885		NXTBM	NB-2-2	3
					79	83	25	144.24	5.4	7349	10853	12596		NXTBM	NB-2-3	4
					81	83	23.5	150.4	4.8	7186	10912	12685		NXTBM	NB-3	5
07/19/2012	KC20	20311	53	0	77	82	24.5	147.2	4.2	6999	10893	12483		NXTBM	NB-4-1	7
					77	82	24	150	4.1	7269	10982	11976		NXTBM	NB-5-1	9
07/23/2012	KC20	20337	53	0	81	84	25	144.64	5.7	6872	9844	12084		NXTBM	NB-4-2	8
					81	83	24	146.48	5.8	6558	10521	11457		NXTBM	NB-5-2	10
					81	82	25	145.6	5.8	7658	10979	11837		NXTBM	NB-5-3	11
07/25/2012	KC20	20355	53	0	77	78	24	145.52	5.7	7652	9122	10978		NXTBM	NB-4-3	6
					77	80	24.5	143.84	5.7	6784	9696	11288		NXTBM	NB-5-4	12
					77	80	24	145.52	5.3	8766	10490	11448		NXTBM	NB-5-5	13
07/27/2012	KC20	20375	53	0	75	80	24.5	146.64	5.1	7836	8881	11650		NXTBM	NB-5-6	14
					75	81	24	148.48	5.1	8482	10916	12118		NXTBM	NB-6-1	18
07/31/2012	KC20	20390	53	0	79	76	26	143.68	5	8239	9534	11002		NXTBM	NB-5-7	15
					79	77	25	143.76	6	7252	10695	11923		NXTBM	NB-5-8	16
					79	78	24	144.32	5.1	6867	10738	11522		NXTBM	NB-6-2	19
08/02/2012	KC20	20408	53	0	81	78	24.5	148.96	4	7098	10072	12198		NXTBM	NB-5-9	17
					81	78	25	148	5	7141	10986	12309		NXTBM	NB-6-3	20
08/07/2012	KC20	20430	53	0	75	75	24.5	142.16	5.4	7973	9148	10388		NXTBM	NB-7	21
					75	75	23	143.12	5.4	7620	9369	10362		NXTBM	NB-8-1	22
					75	76	24	142.08	5.4	6792	10092	10473		NXTBM	NB-8-2	23
08/10/2012	KC20	20448	53	0	77	73	24	145.44	5.3	7614	10353	12072		NXTBM	NB-8-3	24
					77	73	25	144.88	5.5	6987	10499	11812		NXTBM	NB-9	25



Cement Mill Test Report

Month of Issue: May 2013

Plant:	St-Constant, Quebec
Product:	Type SF™ Cement - IP (8)
Silo:	6
Manufactured:	April 2013

ASTM C 595-11 and AASHTO M 240-09 Standard Requirements

CHEMICAL REQUIREMENTS			PHYSICAL REQUIREMENTS		
	Spec limit	Test Result		Spec limit	Test Result
<i>Rapid Method, X-Ray (C 114)</i>					
SiO ₂ (%)	---	25.0	Air content of mortar (%) (C 185)	12 max	6.9
Al ₂ O ₃ (%)	---	4.3	Blaine Fineness (m ² /kg) (C 204)	---	605
Fe ₂ O ₃ (%)	---	3.0	Retained on a 45 µm sieve (%) (C 430)	---	4.7
CaO (%)	---	57.4	Autoclave expansion (%) (C 151)**	0.80 max	0.03
MgO (%)	6.0 max	2.6	Compressive strength (PSI) (C 109)		
SO ₃ (%)*	4.0 max	3.6	3 days	1890 min	4555
Loss on ignition (%)	5.0 max	2.4	7 days	2900 min	6025
Total Alkalis (%Na ₂ Oeq)	---	0.86	28 days (reflects previous month's data)	3620 min	7810
CO ₂ (%)	---	4.0	Time of setting (minutes)		
CaCO ₃ in Limestone (%)	70 min	88	Vicat Initial (C 191)	45 - 420	135
Limestone in cement (%)	5.0 max	3.0	Sulfate Expansion (C 1038)**	---	0.006
			Water Extractable Sulfate (C 265)**	0.5 g/L max	0.2

* May exceed 4.0% SO₃ maximum if the C-265 test result is not greater than 0.5 g/L.

** Current Production run not available - most recent provided.

We certify that the above described cement, at the time of shipment, meets the chemical and physical requirements of ASTM C 595-11 and AASHTO M 240-09.

This product meets the requirements of NYSDOT Item 701-03, Type SF blended cement, with alkali levels which exceed 0.70%.

For additional information on this cement test report, please contact our regional technical representative David Johns at (484) 695-5902.

ECAN BU - St-Constant Plant
1 Chemin Lafarge, St-Constant
Phone: 450-632-7750 #218

Certified By:

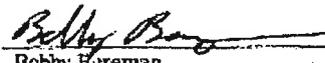
Pascale Poulin - Quality Coordinator
May 15, 2013

ASTM C618 / AASHTO M295 Testing of
Brayton Point Fly Ash

Sample Type: 3200-ton Report Date: 5/9/2013
 Sample Date: 3/11 - 3/21/13 MTRF ID: 681BP
 Sample ID:

Chemical Analysis	ASTM / AASHTO Limits		ASTM Test Method
	Class F	Class C	
Silicon Dioxide (SiO ₂)	58.52 %		
Aluminum Oxide (Al ₂ O ₃)	28.04 %		
Iron Oxide (Fe ₂ O ₃)	5.73 %		
Sum of Constituents	92.29 %	70.0% min 50.0% min	D4326
Sulfur Trioxide (SO ₃)	0.12 %	5.0% max 5.0% max	D4326
Calcium Oxide (CaO)	1.27 %		D4326
Moisture	0.05 %	3.0% max 3.0% max	C311
Loss on Ignition	2.96 %	6.0% max 5.0% max 6.0% max 5.0% max	C311 AASHTO M295
Available Alkalies, as Na ₂ O When required by purchaser	0.87 %	not required 1.5% max 1.5% max	C311 AASHTO M295
Physical Analysis			
Fineness, % retained on #325	15.80 %	34% max 34% max	C311, C430
Strength Activity Index - 7 or 28 day requirement 7 day, % of control	93 %	75% min 75% min	C311, C109
28 day, % of control	99 %	75% min 75% min	
Water Requirement, % control	98 %	105% max 105% max	
Autoclave Soundness	-0.01 %	0.8% max 0.8% max	C311, C151
Density	2.29		C604

Headwaters Resources certifies that pursuant to current ASTM C618 protocol for testing, the test data listed herein was generated by applicable ASTM methods and meets the requirements of ASTM C618 for Class F fly ash.


 Bobby Bergman
 MTRF Manager



Materials Testing & Research Facility
 2650 Old State Highway 113
 Taylorsville, Georgia 30178
 P: 770.684.0102
 F: 770.684.5114

Wm.E.Dailey, Inc.

Gradation Work Sheet

Nominal Size of Aggregate Precast Sand **Date** 06/03/13

Minus #200 Wash and Moisture

Wet Weight	<u>691.5</u>	% Total Moisture	<u>3.58</u>
Dry Weight	<u>667.6</u>	Weight of Minus #200 Material	
Dry Weight After Wash	<u>657.0</u>	(Added to Pan Weight)	<u>10.6</u>

US Standard Sieve Sizes mm (In)	Weight	% Retained	% Passed
50.0 (2)			
45.0 (1 3/4)			
37.5 (1 1/2)			
25.0 (1)			
19.0 (3/4)			
12.5 (1/2)			
9.5 (3/8)			100.0
4.75 (#4)	6.0	0.9	99.1
2.36 (#8)	58.7	8.8	90.3
1.18 (#16)	205.0	30.7	59.6
0.600 (#30)	176.9	26.5	33.1
0.300 (#50)	122.8	18.4	14.7
0.150 (#100)	64.8	9.7	5.0
0.075 (#200)	18.0	2.7	2.3
PAN	15.4	2.3	
TOTAL	667.6	100	

Fineness Modulus = 2.98

Fracture and T + E Count

Weight of T + E Portion _____	% T + E _____
Weight of Fractured Portion _____	% Fracture _____
Total Weight of Sample _____	

Chris Thomas Inspector

Wm.E.Dailey, Inc.

Gradation Work Sheet

Nominal Size of Aggregate _____ **ASTM #67** _____ **Date** 06/03/13

Minus #200 Wash and Moisture

Wet Weight 10874 % Total Moisture 1.10

Dry Weight 10756 Weight of Minus #200 Material
(Added to Pan Weight) _____

US Standard Sieve Sizes mm (in)	Weight	% Retained	% Passed
50.0 (2)			
45.0 (1 3/4)			
37.5 (1 1/2)			
25.0 (1)			100.0
19.0 (3/4)	409	3.8	96.2
12.5 (1/2)	3829	35.6	60.6
9.5 (3/8)	2990	27.8	32.8
4.75 (#4)	3474	32.3	0.5
2.36 (#8)	32	0.3	0.2
1.18 (#16)			
0.600 (#30)			
0.300 (#50)			
0.150 (#100)			
0.075 (#200)			
PAN	22	0.2	
TOTAL	10756	100	

Fineness Modulus = 6.70

Fracture and T + E Count

Weight of T + E Portion 80.6 % T + E 3

Weight of Fractured Portion 2256.5 % Fracture 92

Total Weight of Sample 2455.2

Minus #200 Wash DRY	2805.6
Dry after Wash	2794.5
Weight minus #200 Material	11.1

Chris Thomas Inspector

% Minus #200 0.40



The Chemical Company

May 21, 2013

William E. Dailey Precast, LLC
295 Airport Road
Shaftsbury, Vermont 05262

Attention: Jared Steller
Project: D262100 - Dingle Ridge Road
Project location: United States

Certificate of Conformance
MB-AE™ 90
BASF Corporation* Air-Entraining Admixture for Concrete

*(successor in interest to BASF Construction Chemicals, LLC , which is successor by merger to BASF Admixtures, Inc., formerly known as Degussa Admixtures, Inc., formerly known as Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:

That MB-AE 90 is a BASF Corporation Air-Entraining Admixture for concrete; and

That no calcium chloride or chloride based ingredient is used in the manufacture of MB-AE 90; and

That MB-AE 90, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.000068 percent (0.68 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That MB-AE 90 meets the requirements of ASTM C 260, Corps of Engineers' CRD-C 13 and AASHTO M154, the Standard Specifications for Air-Entraining Admixtures for Concrete.

Richard Hubbard
Sr. Technical Marketing Specialist, BASF Corporation

BASF Corporation
23700 Chagrin Boulevard
Cleveland, OH 44122
216 839-7500 ph
www.masterbuilders.com

**Master
Builders**
Admixture Solutions

Description

MB-AE 90 air-entraining admixture is for use in concrete mixtures. It meets the requirements of ASTM C 260, AASHTO M 154 and CRD-C 13.

Applications

Recommended for use in:

- Concrete exposed to cyclic freezing and thawing
- Production of high-quality normal or lightweight concrete (heavyweight concrete normally does not contain entrained air)

MB-AE™ 90

Air-Entraining Admixture

Features

- Ready-to-use in the proper concentration for rapid, accurate dispensing

Benefits

- Improved resistance to damage from cyclic freezing and thawing
- Improved resistance to scaling from deicing salts
- Improved plasticity and workability
- Reduced permeability – increased watertightness
- Reduced segregation and bleeding

Performance Characteristics

Concrete durability research has established that the best protection for concrete from the adverse effects of freezing and thawing cycles and deicing salts results from: proper air content in the hardened concrete, a suitable air-void system in terms of bubble size and spacing, and adequate concrete strength, assuming the use of sound aggregates and proper mixing, transporting, placing, consolidation, finishing and curing techniques. MB-AE 90 admixture can be used to obtain adequate freeze-thaw durability in a properly proportioned concrete mixture, if standard industry practices are followed.

Air Content Determination: The total air content of normal weight concrete should be measured in strict accordance with ASTM C 231, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method" or ASTM C 173/C 173M, "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method." The air content of lightweight concrete should only be determined using the Volumetric Method. The air content should be verified by calculating the gravimetric air content in accordance with ASTM C 138/C 138M, "Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete." If the total air content, as measured by the Pressure Method or Volumetric Method and as verified by the Gravimetric Method, deviates by more than 1-1/2%, the cause should be determined and corrected through equipment calibration or by whatever process is deemed necessary.

Guidelines for Use

Dosage: There is no standard dosage for MB-AE 90 admixture. The exact quantity of air-entraining admixture needed for a given air content of concrete varies because of differences in concrete-making materials and ambient conditions. Typical factors that might influence the amount of air entrained include: temperature, cementitious materials, sand gradation, sand-aggregate ratio, mixture proportions, slump, means of conveying and placement, consolidation and finishing technique.

Product Data: MB-AE™ 90

The amount of MB-AE 90 admixture used will depend upon the amount of entrained air required under actual job conditions. In a trial mixture, use 1/4 to 4 fl oz/cwt (16-260 mL/100 kg) of cementitious material. Measure the air content of the trial mixture, and, if needed, either increase or decrease the quantity of MB-AE 90 admixture to obtain the desired air content.

In mixtures containing water-reducing or set-control admixtures, the amount of MB-AE 90 admixture needed may be somewhat less than the amount required in plain concrete.

Due to possible changes in the factors that can affect the dosage of MB-AE 90 admixture, frequent air content checks should be made during the course of the work. Adjustments to the dosage should be based on the amount of entrained air required in the mixture at the point of placement.

If an unusually high or low dosage of MB-AE 90 admixture is required to obtain the desired air content, consult your BASF Construction Chemicals representative. In such cases, it may be necessary to determine that, in addition to a proper air content in the fresh concrete, a suitable air-void system is achieved in the hardened concrete.

Dispensing and Mixing: Add MB-AE 90 admixture to the concrete mixture using a dispenser designed for air-entraining admixtures, or add manually using a suitable measuring device that ensures accuracy within plus or minus 3% of the required amount.

For optimum, consistent performance, the air-entraining admixture should be dispensed on damp, fine aggregate. If the concrete mixture contains fine lightweight aggregate, field evaluations should be conducted to determine the best method to dispense the air-entraining admixture.

Precaution

In a 2005 publication from the Portland Cement Association (PCA R&D Serial No. 2789), it was reported that problematic air-void clustering that can potentially lead to above normal decreases in strength was found to coincide with late additions of water to air-entrained concretes. Late additions of water include the conventional practice of holding back water during batching for addition at the jobsite. Therefore, caution should be exercised with delayed additions of water to air-entrained concrete. Furthermore, an air content check should be performed after any post-batching addition to an air-entrained concrete mixture.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: MB-AE 90 admixture will neither initiate nor promote corrosion of reinforcing and prestressing steel embedded in concrete, or of galvanized floor and roof systems. No calcium chloride or other chloride-based ingredients are used in the manufacture of this admixture.

Compatibility: MB-AE 90 admixture may be used in combination with any BASF Construction Chemicals admixture, unless stated otherwise on the data sheet for the other product. When used in conjunction with other admixtures, each admixture must be dispensed separately into the concrete mixture.

Storage and Handling

Storage Temperature: MB-AE 90 admixture should be stored and dispensed at 31 °F (-0.5 °C) or higher. Although freezing does not harm this product, precautions should be taken to protect it from freezing. If MB-AE 90 admixture freezes, thaw at 35 °F (2 °C) or above and completely reconstitute by mild mechanical agitation. **Do not use pressurized air for agitation.**

Shelf Life: MB-AE 90 admixture has a minimum shelf life of 18 months. Depending on storage conditions, the shelf life may be greater than stated. Please contact your BASF Construction Chemicals representative regarding suitability for use and dosage recommendations if the shelf life of MB-AE 90 admixture has been exceeded.

Safety: Chemical goggles and gloves are recommended when transferring or handling this material.

Packaging

MB-AE 90 admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Material Safety Data Sheets: MB-AE 90 admixture.

Additional Information

For additional information on MB-AE 90 admixture, or its use in developing a concrete mixture with special performance characteristics, contact your BASF Construction Chemicals representative.

The Admixture Systems business of BASF Construction Chemicals is a leading provider of innovative additives for specialty concrete used in the ready mix, precast, manufactured concrete products, underground construction and paving markets throughout the NAFTA region. The Company's respected Master Builders brand products are used to improve the placing, pumping, finishing, appearance and performance characteristics of concrete.

BASF Construction Chemicals, LLC
Admixture Systems

www.masterbuilders.com

United States 23700 Chagrin Boulevard, Cleveland, Ohio 44122-5544 ■ Tel: 800 628-9990 ■ Fax: 216 839-8821
Canada 1800 Clark Boulevard, Brampton, Ontario L6T 4M7 ■ Tel: 800 387-5862 ■ Fax: 905 792-0651

™BASF Construction Chemicals, LLC

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**Master
Builders**



The Chemical Company

May 21, 2013

William E. Dailey Precast, LLC
295 Airport Road
Shaftsbury, Vermont 05262

Attention: Jared Steller
Project: D262100 - Dingle Ridge Road
Project location: United States

Certificate of Conformance
GLENIUM® 3400 NV
BASF Corporation* Admixture for Concrete

*(successor in interest to BASF Construction Chemicals, LLC, which is successor by merger to BASF Admixtures, Inc., formerly known as Degussa Admixtures, Inc., formerly known as Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:

That GLENIUM 3400 NV is a BASF Corporation High Range Water-Reducing Admixture for concrete; and

That no calcium chloride or chloride based ingredient is used in the manufacture of GLENIUM 3400 NV; and

That GLENIUM 3400 NV, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00023 percent (2.3 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and

That GLENIUM 3400 NV meets the requirements for a Type F, Water-Reducing, High Range Admixture specified in ASTM C 494, Corps of Engineers' CRD-C 87 and AASHTO M194, the Standard Specifications for Chemical Admixtures for Concrete.

Richard Hubbard
Sr. Technical Marketing Specialist, BASF Corporation

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**Master
Builders**
Admixture Solutions

Description

Glenium 3400 NV ready-to-use high-range water-reducing admixture is a patented new generation of admixture based on polycarboxylate chemistry. Glenium 3400 NV admixture is very effective in producing concretes with different levels of workability including applications that require self-consolidating concrete (SCC). Glenium 3400 NV admixture is particularly effective in producing concrete mixtures that provide longer "working time" for placement and finishing operations, without compromising very high early strength requirements. Glenium 3400 NV admixture meets ASTM C 494/C 494M requirements for Type A, water-reducing, and Type F, high-range water-reducing, admixtures.

Applications

Recommended for use in:

- Concrete with varying water reduction requirements (5-40%)
- Concrete applications requiring very high-early strength development
- Concrete where high flowability, increased stability and durability are needed
- Rheodynamic® SCC
- 4x4™ Concrete for fast track construction

GLENIUM® 3400 NV

High-Range Water-Reducing Admixture

Features

- Maximum dosage effectiveness for a given water reduction
- Controlled rheology
- Improved retention of slump and workability
- Strength enhancement package

Benefits

- Can be used in a wide variety of concrete mixtures as a Type A or Type F admixture
- Extremely high early strength development
- Improved finishability and surface appearance
- May reduce/eliminate need for vibration and heat curing
- Improves overall production cost efficiencies
- Increases productivity

Performance Characteristics

Compressive Strength: Concrete produced with Glenium 3400 NV admixture achieves significantly higher early compressive strength compared to plain concrete and concrete mixtures containing naphthalene, melamine, and early generation polycarboxylate high-range water-reducing admixtures.

Mixture Data: Laboratory Evaluation: Cementitious Material: 700 lb/yd³ (415 kg/m³), Water/Cementitious Materials: 0.40, Ambient temperature: 70 °F (21 °C).

Compressive Strength, psi (MPa)

Mixture	12 h	24 h
Conventional Polycarboxylate	3930 (27.1)	5690 (39.2)
Glenium 3400 NV admixture	4260 (29.4)	6480 (44.7)

Mixture Data: Field Evaluation: Cementitious Materials: 700 lb/yd³ (415 kg/m³), Water/Cementitious Materials: 0.37, Cure Time: 19.75h.

Compressive Strength, psi (MPa)

Mixture	Ambient Cure	Sure Cure System
Conventional Polycarboxylate	4660 (32.1)	5600 (38.6)
Glenium 3400 NV admixture	5550 (38.3)	6670 (46.0)

Product Data: GLENIUM® 3400 NV

Slump Retention: Glenium 3400 NV admixture was developed to provide extremely high-early strength concrete that exhibits good slump and workability retention characteristics, relative to other high-early strength-producing high-range water-reducing admixtures. A field trial mixture is recommended to ensure that the desired slump at a specific time period is achieved.

Guidelines for Use

Dosage: Glenium 3400 NV admixture has a recommended dosage range of 2-12 fl oz/cwt (130-780 mL/100 kg) of cementitious materials. For most applications, dosages in the range of 2-6 fl oz/cwt (130-360 mL/100 kg) will provide excellent performance. For very high performance and Rheodynamic Self-Consolidating Concrete mixtures, up to 12 fl oz/cwt (780 mL/100 kg) of cementitious materials can be utilized. **Because of variations in concrete materials, job site conditions and/or applications, dosages outside of the recommended range may be required.** In such cases, contact your local BASF Construction Chemicals representative.

Mixing: Glenium 3400 NV admixture can be added with the initial batch water or as a delayed addition. However, optimum water reduction is generally obtained with a delayed addition.

Product Notes

Corrosivity – Non-Chloride, Non-Corrosive: Glenium 3400 NV admixture will neither initiate nor promote corrosion of reinforcing steel embedded in concrete, prestressing steel or of galvanized steel floor and roof systems. Neither calcium chloride nor other chloride-based ingredients are used in the manufacture of Glenium 3400 NV admixture.

Compatibility: Glenium 3400 NV admixture is compatible with most admixtures used in the production of quality concrete, including normal, mid-range and high-range water-reducing admixtures, air-entrainers, accelerators, retarders, extended set control admixtures, corrosion inhibitors, and shrinkage reducers.

Do not use Glenium 3400 NV admixture with admixtures containing beta-naphthalene sulfonate. Erratic behaviors in slump, workability retention and pumpability may be experienced.

Storage and Handling

Storage Temperature: Glenium 3400 NV admixture must be stored at temperatures above 40 °F (5 °C). If Glenium 3400 NV admixture freezes, it can be thawed by warming and reconstituted by mechanical agitation. **Do not use pressurized air for agitation.**

Shelf Life: Glenium 3400 NV admixture has a minimum shelf life of 6 months. Depending on storage conditions, the shelf life may be greater than stated. To ensure the longest shelf life potential, recirculation is recommended. Please contact your BASF Construction Chemicals representative regarding suitability for use and dosage recommendations if the shelf life of Glenium 3400 NV admixture has been exceeded.

Packaging

Glenium 3400 NV admixture is supplied in 55 gal (208 L) drums, 275 gal (1040 L) totes and by bulk delivery.

Related Documents

Material Safety Data Sheets: Glenium 3400 NV admixture.

Additional Information

For additional information on Glenium 3400 NV admixture or its use in developing concrete mixtures with special performance characteristics, contact your BASF Construction Chemicals representative.

The Admixture Systems business of BASF Construction Chemicals is a leading provider of innovative additives for specialty concrete used in the ready mix, precast, manufactured concrete products, underground construction and paving markets throughout the NAFTA region. The Company's respected Master Builders brand products are used to improve the placing, pumping, finishing, appearance and performance characteristics of concrete.

BASF Construction Chemicals, LLC
Admixture Systems

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The Chemical Company

May 21, 2013

William E. Dailey Precast, LLC
295 Airport Road
Shaftsbury, Vermont 05262

Attention: Jared Steller
Project: D262100 - Dingle Ridge Road
Project location: United States

Certificate of Conformance
Rheocrete® CNI
BASF Corporation* Integral Corrosion Inhibiting Admixture for Concrete

*(successor in interest to BASF Construction Chemicals, LLC, which is successor by merger to BASF Admixtures, Inc., formerly known as Degussa Admixtures, Inc., formerly known as Master Builders, Inc.)

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:

That Rheocrete CNI is an integral Corrosion Inhibiting Admixture for concrete; and

That no calcium chloride or chloride based ingredient is used in the manufacture of Rheocrete CNI; and

That Rheocrete CNI, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00018 percent (1.8 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100kg (1 fluid ounce per 100 pounds) of cement; and

That Rheocrete CNI meets the requirements for a Type C, Accelerating Admixture specified in ASTM C 494, Corps of Engineers' CRD-C 87 and AASHTO M194, the Standard Specifications for Chemical Admixtures for Concrete.

Richard Hubbard
Sr. Technical Marketing Specialist, BASF Corporation

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RHEOCRETE[®] CNI

Corrosion-inhibiting admixture for steel reinforced concrete

Description

RHEOCRETE[®] CNI is a calcium nitrite based corrosion-inhibiting admixture for steel reinforced concrete. RHEOCRETE[®] CNI admixture contains a minimum of 30% active ingredients by mass and meets ASTM C 494 interim requirements for Type C, Accelerating Admixtures.

Benefits

RHEOCRETE[®] CNI admixture is a corrosion inhibitor that provides basic corrosion protection for steel reinforced concrete structures.

- Provides effective corrosion protection against chlorides in concrete.
- Extends the service life of reinforced concrete structures.

Packaging and availability

RHEOCRETE[®] CNI admixture is available in 210 litre drums, and by bulk delivery.

Mechanism

In the alkaline environment of concrete, a natural passive ferric oxide layer forms on the surface of embedded reinforcing steel and protects the steel from corrosion. This passive oxide layer may break down in the presence of chlorides and moisture resulting in corrosion of the steel.

RHEOCRETE[®] CNI admixture delays corrosion by repassivating defects on the steel surface. These defects are ferrous oxide ions that are susceptible to chloride attack. When chloride ions attack the ferrous ions, they combine to create a ferrous chloride complex (rust) and initiate pitting corrosion on the reinforcing steel. If untreated, chloride ions continue to attack newly exposed ferrous ions and form additional expansive corrosion products leading to staining, cracking and spalling of the concrete.

Nitrite ions contained in RHEOCRETE[®] CNI admixture are effective in preventing ferrous chloride complex formation by reacting with defective ferrous oxide ions prior to chloride attack and reforming the passive layer. Nitrite ions surround the defective ferrous oxide ion and convert it to a more stable ferric ion species less susceptible to corrosion. This oxidation reaction serves to repassivate the reinforcing steel and re-establish the barrier between the steel and chlorides that initiate corrosion.

Applications

RHEOCRETE[®] CNI admixture will effectively inhibit corrosion in all types of steel reinforced concrete including precast / prestressed and post-tensioned applications. RHEOCRETE[®] CNI admixture is recommended for use in parking garages, bridge decks, marine structures, slabs, floors, and other reinforced concrete applications requiring corrosion protection against chlorides from deicing salts or marine exposure. RHEOCRETE[®] CNI admixture will also inhibit the potentially corrosive effects of chloride-bearing concrete-making ingredients.

Compatibility

RHEOCRETE[®] CNI admixture may be used with Portland cements and mineral admixtures approved under ASTM, AASHTO, or CRD specifications. It is compatible with other chemical admixtures, including water reducers, superplasticizers, retarders and air entrainers. Chemical admixtures should be added separately to the concrete to ensure desired results.

Concrete setting time

Concrete setting times may be accelerated with the use of RHEOCRETE[®] CNI admixture. If desired, a retarding or hydration control



The Chemical Company

RHEOCRETE® CNI

admixture may be added to the concrete mixture to offset the acceleration effects of RHEOCRETE® CNI admixture. Please contact your local BASF representative for additional information on set-balancing admixtures for concrete.

Dosage

RHEOCRETE® CNI is recommended for use at a rate of 5.0 to 30.0 L/m³ of concrete, depending upon the severity of the corrosion environment and the anticipated chloride loading of the structure.

RHEOCRETE® CNI may be used to offset the potentially corrosive effects of chloride-bearing concrete-making ingredients, and in applications where the initial chloride ion content of the concrete may exceed code requirements or other specified chloride limits.

Chloride protection limits for RHEOCRETE® CNI are as given in the dosage table. The limits for applications involving the use of chloride-bearing materials are based on a critical chloride-to-nitrite ratio of 0.90 in accordance with the recommendations of the Federal Highway Administration (FHWA). These limits may also be used in very severe corrosion environments for enhanced protection, if desired. The chloride protection limits given for all other applications, such as parking structures and bridges, are based on critical chloride-to-nitrite ratios that range from 1.20 to 1.50. Please contact your local BASF representative for additional information regarding dosage rates of RHEOCRETE® CNI for your application.

5.0	1.2	—
10.0	2.4	3.6
15.0	3.6	5.9
20.0	4.8	7.7
25.0	6.0	8.9
30.0	7.2	9.5

BASF recommends that steel reinforced concrete structures that will be exposed to chlorides in service should be designed in accordance with ACI 318, ACI 357, CSA, AASHTO or other applicable codes.

Chemical composition

RHEOCRETE® CNI admixture contains a minimum of 30% calcium nitrite by mass as an active ingredient. RHEOCRETE® CNI is identical in composition and mechanism to other commercially available 30% calcium nitrite corrosion-inhibiting admixtures; and at equal dosage rates, provides similar performance and corrosion protection.

The water content of RHEOCRETE® CNI admixture is approximately 7.3 pounds per gallon. This water contributes to the consistency of the concrete mixture and the hydration of the cementitious materials. The water contributed by RHEOCRETE® CNI should be used in the calculation of the water-to-cementitious material ratio of the concrete.

Table 1 *

RHEOCRETE® CNI Dosage L/m ³	Chloride Protection Limit, kg/m ³	
	With Chloride-Bearing Materials	All Other Applications
5.0	1.2	—
10.0	2.4	3.6
15.0	3.6	5.9
20.0	4.8	7.7
25.0	6.0	8.9
30.0	7.2	9.5