

# SUBMITTAL



Submittal number	15.0	Date	07/09/2018
Project	TRAILS AT CROWFOOT F1 & 9	6954 N. CROWFOOT VALLEY RD. PARKER, CO 80138	
Project number	201810		
Spec section			
Subsection		Status	Open
Current action	Not yet submitted	Ball in court	
Topic	Concrete Misc: manhole bases, collars, thrust blocks, & Misc. (Additional Supplier)		

Submitter	
Reviewer	
Cc	

Date submitted	07/09/2018	Submission due date	07/09/2018
Released for review	07/09/2018	Review due date	07/13/2018
Date returned		Required on site date	
Date closed			

<b>Notes</b>



# LETTER OF TRANSMITTAL

## PIPELINE CONTRACTORS

8600 Verbena St.  
Commerce City, CO 80022  
Office 303-289-4355  
Fax 303-289-4353

### ISSUED TO:

Owner ATTN: Con Cockrun, Kelley Trucking

DATE:

7/5/18

TRANSMITTAL NO.:

A-016

### REGARDING:

Project JBS Job No 0150

We are issuing you under separate cover the following (via):

Email

- Blue Prints
- Submittals
- Change Order
- Request for Information
- Copy of a letter
- Shop Drawings

#	Copies	Item Dated	Item #	Description
	1-Electronic		A-016	Concrete for Manhole Bases, Collars, Thrust Blocks and Misc.

- For your bid
- For Approval
- As Requested
- Returned for Correction
- For Review and Comment
- For Pricing

Prints are loaned to you and are to be returned to us by:

Date: \_\_\_\_\_

Bids are due on or before:

Date: \_\_\_\_\_

### COMMENTS

JBS will submit on multiple suppliers to help expedite our orders. This is supplier number 2.

CC:

\_\_\_\_\_

*Amie Parent*

Amie Parent

JBS Pipeline Contractors



18-0004432  
7/5/2018

JBS PIPELINE CONTRACTORS

Attention: Amie Parent

RE: CROWFOOT F1 & F9

Bestway Concrete is pleased to attach our concrete mixes for the above project. Please reference the mix code when ordering concrete. Please contact **Dispatch at 303-637-0900** to place your order. It is the responsibility of the contractor to order additives required in concrete i.e. fiber, color, accelerator, etc.

This submission contains the following mix designs:

<u>Mix Code</u>	<u>Description/Usage</u>
<b>45VN21E4C</b>	<b>Douglas County B/D/P Handwork</b>
<b>45VN21B2C</b>	<b>Douglas County B/D/P Low Slump</b>

Bestway Concrete Company will deliver concrete as to the specifications ordered. The physical properties of the concrete are measured at the point of discharge from our mixer truck unless otherwise agreed to by all parties prior to delivery. If the concrete is pumped, placed in a bucket or other device or otherwise manipulated prior to placement the quality will become the responsibility of the contractor or subcontractor responsible for the placement.

Bestway Concrete produces in accordance to ACI and ASTM standards. We strive to provide our customers with quality products and service. We look forward to working with you on this project. If you have any questions please give us a call.

Sincerely yours,

A handwritten signature in blue ink that reads "Stacy Ehrlick". The signature is written in a cursive, flowing style.

Stacy Ehrlick  
Sales Associate  
720.215.9590  
Stacy.Ehrlick@burnco.com



CROWFOOT F1 & F9

Mixture Usage	Mix Code	Special Attribute	PSI	@__d	Max WC	Slump	Tolerance	Air (%)	Tolerance	Approved Y/N
Douglas County B/D/P Handwork	45VN21E4C		4500	@28D	0.44	4.5	- 1.00"	6.50	+/- 1.5%	
Douglas County B/D/P Low Slump	45VN21B2C		4500	@28D	0.44	2.5	- 1.00"	6.50	+/- 1.5 %	







# CRMCA Concrete Quality Pre-Construction Checklist

## Test Specimen Storage and Transportation

**Standard Curing Method:** (Concrete Acceptance) (Circle Yes or No)

- Immersed in water-controlled temperature environment (Preferred)      yes      no
- Storage box-controlled temperature environment      yes      no
- Exposed to the environment      yes      no

Who's responsible for providing specimen storage water tank or box? \_\_\_\_\_

Who's responsible for maintaining the temperature of the storage environment? \_\_\_\_\_

Note 6: ASTM C31 states, "Immediately after molding and finishing, the specimens shall be stored for a period up to 48h in a temperature range from 60 and 80 F and in an environment preventing moisture loss from the specimens. For concrete mixtures with a specified strength of 6000 psi or greater, the initial curing temperature shall be between 68 and 78 F." ASTM C31 also states, "The storage temperature shall be controlled by use of heating and cooling devices, as necessary. Record the temperature using a maximum-minimum thermometer."

Note 7: ASTM C31 states, "Upon completion of initial curing and within 30 min after removing the molds, cure specimens with free water maintained on their surfaces at all times at a temperature of 73.5 +/- 3.5 F. ..."

### Transportation of Specimens to the Laboratory

ASTM C31, Section 11.1 states, "Specimens shall not be transported until at least 8 h after final set. During transporting, protect the specimens with suitable cushioning material to prevent damage from jarring. During cold weather, protect the specimens from freezing with suitable insulation material. Prevent moisture loss during transportation by wrapping the specimens in plastic, wet burlap, by surrounding them with wet sand, or tight fitting plastic caps on plastic molds. Transportation time shall not exceed 4 h."

When will specimens, cast on days preceding non-work days, be transported to the laboratory?

Please explain: \_\_\_\_\_

**Field Curing Method:** (Form or Shoring Removal but not Acceptance) (Circle Yes or No)

- Storage under conditions consistent with concrete in the structure      yes      no
- Maturity      yes      no

## Acceptance Criteria for Hardened Concrete (ACI 301/318)

In accordance with ACI 318-14, Section 26.12.1.1 (e) and ACI 301 Section 1.6.3.1 (a-c) the Owner's testing agency shall report results to the Architect/Engineer, Contract, Concrete Supplier, and if requested, the Owner. ACI 301 also requires that the testing agency issue a report immediately, to these parties when it appears that furnished material is not in compliance with the specifications. Test results from standard molded and cured strength specimens will be evaluated separately for each concrete mixture. Evaluation is valid only if tests have been conducted in accordance with specified procedures. Each Validation of tests not conducted in accordance with specified procedures will be the responsibility of the Owner's testing agency.



# CRMCA Concrete Quality Pre-Construction Checklist

## Contact Information for Test Results to be sent to (via email, fax, mail) to

Owner:	_____	Architect:	_____
Structural Engineer:	_____	Concrete Supplier:	_____
General Contractor:	_____	Other:	_____

## Acceptance of Concrete Strength in accordance with ACI 301-10

The strength of standard molded and cured strength specimens is satisfactory if the following criteria are met:

- 1.6.6.1 a Every average of three consecutive strength tests equals or exceeds the specified compressive strength  $f'_c$ .
- 1.6.6.1 b No strength test result falls below  $f'_c$  by more than 500 psi when  $f'_c$  is 5000 psi or less, or by more than 0.10  $f'_c$  when  $f'_c$  is more than 5000 psi.

### Coring

Section 1.6.6.2- The strength of concrete in the area represented by cores, tested in accordance with ASTM C42, is considered adequate when the average compressive strength of the cores is at least 85% of  $f'_c$  and if no single core is less than 75% of  $f'_c$ .

## Statement of Acknowledgement

The American Concrete Institute (ACI) and the ASTM International have established many standards and practices related to the performance and safety of concrete construction. The quality of concrete construction is heavily dependent upon the commitment of the project team to the standard practices associated with the production, delivery, placement, and testing of ready mixed concrete. We believe the information in this document accurately reflects the discussion(s) between all attendees.

	(Circle Yes or No)			(Circle Yes or No)	
Owner:	Yes	No	Architect:	Yes	No
Structural Engineer:	Yes	No	Construction Manager:	Yes	No
General Contractor:	Yes	No	Concrete Supplier:	Yes	No
Owners Testing Agency:	Yes	No	Testing Agency:	Yes	No

**Additional Items for Possible Discussion include:** Subgrade prep, Scheduling, Delivery, Washout Location, Jointing, Curing (evaporation control, moisture protection, hot/cold weather)

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### Concrete Mix Submittal

**Mix Code:** 45VN21E4C                      **Submittal:** 18--000443                      **Version:** 2                      **Date:** 7/5/2018  
**Description:** Douglas County B/D/P Handwork  
**Customer:** JBS PIPELINE CONTRACTORS  
**Project Name:** Crowfoot F1 & F9  
**Class / Use:**

Bestway Concrete Company will deliver concrete as to the specifications ordered. The physical properties of the concrete are to be measured at the point of discharge from our mixer truck unless otherwise agreed to by all parties prior to delivery. If the concrete is pumped, placed in a bucket or other device or otherwise manipulated prior to placement, the quality will become the responsibility of the contractor responsible for the placement.

**Concrete Properties:**

Slump: 4.5                      - 1.00"                      Strength Class: 4500 psi                      Maximum W/C Ratio: 0.44  
 Air Content: 6.5                      +/- 1.5%                      Sand / Aggregate Ratio: 38.7 %  
 Unit Weight: 140.9                      lb/ft3

Material Type	Description	Source Supplier	ASTM	Design Quantity	Specific Gravity	Volume (ft3)	
Cement	CEM1	Mountain Cement-Laramie	C150	576 lb	3.15	2.93	
Fly Ash	FLYASH	Headwaters Resources-Bridger	C618	102 lb	2.46	0.66	
Coarse Aggregate	CRUSHED #57-67	Bestway Aggregates-Church-McKay Pit	C33	1780 lb	2.67	10.68	
Fine Aggregate	CONCRETE SAND	Bestway Aggregates-Firestone Pit	C33 Fine	1113 lb	2.64	6.75	
Admixture	Air Entrainment	Grace Admixtures-AEA	C260	4 lq oz	-	-	
Admixture	LOW RANGE WRA	Grace Admixtures-Type A	C494	3.0 dose	-	-	
Admixture	MIDRANGE WRA	Grace Admixtures-Type A/F	C494	4.0 dose	-	-	
Water	WATER1	Water-Potable	C1602	299 lb	1.00	4.78	
				<b>Air Content</b>	6.00 %	-	1.65
				<b>Yield</b>	3869 lb	-	27.46

Prepared By :



Stacy Ehrlick

Sales Associate

# STRENGTH PERFORMANCE REPORT

Mix : 45VN21E4C  
 Period : 29 Aug 2017 To 18 Sep 2017

Specified Strength	4500	Strength Type	Compressive Test	28 Day	
Number of Tests	30	Over Design Type	ACI 318 >= 30 Tests	Within Test CofV Factor	1.429
Average Strength	5170	SD Correction Factor	1.000	Within Test SD	150
Standard Deviation	500	Corrected SD	500	Within Test CofV	2.90
Degree of Control	VERY GOOD	Corrected CofV	9.7	Within Test CofV Control	EXCELLENT
Coefficient of Variation	9.7	f'c + 1.34 * s	5170	Batch-to-Batch SD	480
		f'c + 2.33*s - 500	5170	Batch-to-Batch CofV	9.23
		Required Strength	5170	Cementitious Content	671
Maximum f'c for Mix	4500	Safety Factor	0	Cementitious Efficiency	7.7

	Air Content %	Concrete Temp deg F	Slump in	Strength28D psi
Count	30	29	30	30
Average	6.75	78	4.06	5170
STDEV	1.02	6	0.61	500
COV%	15.1	7.4	15.1	9.6
Range Min	5.00	69	3.00	4550
Range Max	8.00	90	5.00	5970

Date	Sample	Air Content %	Concrete Temp deg F	Slump in	Strength28D psi
9/18/2017	20043857	8.00	80	4.00	4680
9/15/2017	20043075	8.00	73	4.00	5820
9/13/2017	20042355	5.00	69	4.50	5740
	20042185	5.00	86	4.50	5950
9/12/2017	71209	5.40	81	4.00	4600
	71212	7.60	74	5.00	4700
9/8/2017	90672	6.10	75	4.00	4820
	20040586	5.60	78	3.00	4720
	20040529	6.00	77	3.25	5160
	90671	7.00	76	3.50	4630
	90676	7.40	75	4.00	5460
	20040346	5.70	71	4.25	4550
	20040234	7.10	74	3.00	5010
9/7/2017	20040104	7.30	84	4.00	4960
9/6/2017	20039627	6.20	86	4.00	4890
	62825	8.00	80	4.00	5970
	90664	7.00	70	4.75	4920
	81738	7.50	72	5.00	4740
9/5/2017	5897	7.20	73	4.00	5590
9/1/2017	20038754	6.10	90	4.25	5340
	20038681	5.40	79	4.00	4550
	71195	7.90	80	5.00	5110
	62814	7.00	81	4.50	5940
	62813	7.80	80	3.00	5930
	31955	5.00	70	3.75	4930

# STRENGTH PERFORMANCE REPORT

**Mix :** 45VN21E4C  
**Period :** 29 Aug 2017 **To** 18 Sep 2017

Date	Sam ple	Air Content %	Concrete Temp deg F	Slump in	Strength28D psi
8/31/2017	20038084	8.00		4.00	4690
	62808	8.00	76	3.75	5890
8/30/2017	20037917	7.10	81	5.00	4830
	20037888	6.80	87	3.00	5310
8/29/2017	20037429	6.30	88	4.75	5560

Bestway Concrete  
455 W. 115th Avenue, Unit 1  
Northglenn, CO 80234

April 24, 2017  
Revised: May 15, 2017

Attention: Mr. Dan Bentz

Subject: Compressive and Flexural Strength Concrete Trial Mix  
4500 psi, High Slump, 15% Class F Fly Ash  
Firestone Pit ASTM C 33 Fine Aggregate  
Morrison Quarry ASTM C 33 Size No. 57/67 Coarse Aggregate  
WesTest Project No. 542517  
Bestway Mix No. 45VN21E4C

Gentlemen:

This report presents the results of a laboratory trial mix study to determine the compressive strength, flexural strength and plastic properties of concrete. One air-entrained, water-reduced mix was proportioned with a cement content of 576 lbs./yd<sup>3</sup> and a fly ash content of 102 lbs./yd<sup>3</sup>. Mountain Type I/II/V Cement and Headwaters Bridger Class F Fly Ash were used for cementitious materials. Grace Daravair 1000, Zyla 630, and Daracem 55 were used for the air-entraining, normal and mid-range water reducing admixtures, respectively. Compressive strength cylinders were cast for testing at 3, 7 and 28 days age. Flexural strength beams were cast for determination of modulus of rupture at 7 and 28 days age.

The aggregate used in the mix consisted of Firestone Pit ASTM C 33 fine aggregate and Morrison Quarry ASTM C 33 size no. 57/67 coarse aggregate.

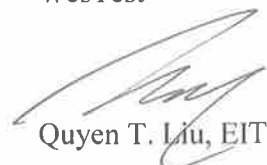
The concrete mix was proportioned in general accordance with American Concrete Institute procedures and your recommendations. Outlined below is a summary of the materials and design criteria used for this mix:

CRITERIA	WESTEST MIX NO. 54251 BESTWAY MIX NO. 45VN21E4C
CEMENT: Mountain Type I/II/V, Laramie	576 lbs./yd <sup>3</sup>
FLY ASH: Headwaters Class F, Bridger	102 lbs./yd <sup>3</sup>
SLUMP (IN.)	4 – 1/2
AIR CONTENT (%)	6.4

Mix proportions, physical properties, compressive strength test results at 3, 7, and 28 days age and modulus of rupture test results at 7 and 28 days age are included on Table 1.

If you have any questions on the contents of this report, please contact us at your convenience.

Sincerely,  
WesTest



Quyen T. Liu, EIT



Reviewed by:

Eric R. West, P.E.



# CONCRETE TRIAL MIX

627 Sheridan Boulevard • Lakewood, CO 80214  
303.975.9959 • office@westest.net

CLIENT: Bestway Concrete  
PROJECT No.: 542517

FINE AGGREGATE SOURCE  
Firestone Pit, ASTM C 33  
Fine Aggregate  
COARSE AGGREGATE SOURCE  
Morrison Quarry ASTM C 33  
Size No. 57/67

BESTWAY MIX NO.: 45VN21E4C  
MIX IDENTIFICATION NO.: 54251

DATE MADE: April 14, 2017

4500 psi, High Slump, 15% Class F Fly Ash

### CONCRETE MIX INFORMATION

MIX PROPORTIONS	PER 1.01 CUBIC YARD	PER 1.01 CUBIC METER
CEMENT: Mountain Type I/II/V, Laramie	576 lbs.	342 kg
FLY ASH: Headwaters Class F, Bridger	102 lbs.	61 kg
AEA: Grace Daravair 1000*	1	1
NWRA: Grace Zyla 630, 3.0 ozs./cwt	20.3 ozs.	785 mL
MRWRA: Grace Daracem 55, 4.0 ozs./cwt	27.1 ozs.	1048 mL
FINE AGG.: ASTM C 33 Fine Aggregate	1100 lbs.	653 kg
COARSE AGG.: ASTM C 33 Size No. 57/67	1785 lbs.	1059 kg
WATER	266 lbs. (31.9 gal.)	158 kg (158 L)

Note: Aggregate weights are based on the aggregate being in the saturated, surface dry condition. Corrections must be made for aggregates that vary from these moisture conditions. \*Information only, field adjust as necessary.

### PHYSICAL PROPERTIES OF CONCRETE

UNIT WT. OF CONCRETE (ASTM C 138)	140.4 pcf	2249 kg/m <sup>3</sup>
YIELD (ASTM C 138)	27.27 ft. <sup>3</sup>	1.02 m <sup>3</sup>
SLUMP (ASTM C 143)	4 - 1/2"	114 mm
AIR CONTENT (ASTM C 231)	6.4%	6.4%
WATER/CEMENTITIOUS RATIO	0.39	0.39
TEMPERATURE	70 °F	21 °C

### COMPRESSIVE STRENGTH OF TEST CYLINDERS (ASTM C 39), psi (MPa)

3 - Day	7 - Day	28 - Day
3580 (24.7)	4300 (29.6)	5810 (40.1)
3740 (25.8)	4260 (29.4)	5890 (40.6)
3660 (25.2)	4380 (30.2)	5850 (40.3)
<b>AVERAGE</b>	<b>AVERAGE</b>	<b>AVERAGE</b>
<b>3660 (25.2)</b>	<b>4310 (29.7)</b>	<b>5850 (40.3)</b>

### MODULUS OF RUPTURE (ASTM C 78), psi (Mpa)

7 - Day	28 - Day
670 (4.6)	770 (5.3)
630 (4.3)	770 (5.3)
	790 (5.4)
	810 (5.6)
<b>AVERAGE</b>	<b>AVERAGE</b>
<b>650 (4.5)</b>	<b>790 (5.4)</b>

WestTest



Eric R. West, P.E.

### Concrete Mix Submittal

**Mix Code:** 45VN21B2C                      **Submittal:** 18--000443                      **Version:** 2                      **Date:** 7/5/2018  
**Description:** Douglas County B/D/P Low Slump  
**Customer:** JBS PIPELINE CONTRACTORS  
**Project Name:** Crowfoot F1 & F9  
**Class / Use:**

Bestway Concrete Company will deliver concrete as to the specifications ordered. The physical properties of the concrete are to be measured at the point of discharge from our mixer truck unless otherwise agreed to by all parties prior to delivery. If the concrete is pumped, placed in a bucket or other device or otherwise manipulated prior to placement, the quality will become the responsibility of the contractor responsible for the placement.

**Concrete Properties:**

Slump: 2.5                      - 1.00"                      Strength Class: 4500 psi                      Maximum W/C Ratio: 0.45  
 Air Content: 6.5                      +/- 1.5 %                      Sand / Aggregate Ratio: 37.9 %  
 Unit Weight: 139.7                      lb/ft3

Material Type	Description	Source Supplier	ASTM	Design Quantity	Specific Gravity	Volume (ft3)	
Cement	CEM1	Mountain Cement-Laramie	C150	576 lb	3.15	2.93	
Fly Ash	FLYASH	Headwaters Resources-Bridger	C618	102 lb	2.46	0.66	
Coarse Aggregate	CRUSHED #57-67	Bestway Aggregates-Church-McKay Pit	C33	1777 lb	2.67	10.66	
Fine Aggregate	CONCRETE SAND	Bestway Aggregates-Firestone Pit	C33 Fine	1072 lb	2.64	6.51	
Admixture	Air Entrainment	Grace Admixtures-AEA	C260	7 lq oz	-	-	
Admixture	LOW RANGE WRA	Grace Admixtures-Type A	C494	3.0 dose	-	-	
Water	WATER1	Water-Potable	C1602	305 lb	1.00	4.89	
				<b>Air Content</b>	6.50 %	-	1.78
				<b>Yield</b>	3832 lb	-	27.44

Prepared By :



Stacy Ehrlick

Sales Associate

# STRENGTH PERFORMANCE REPORT

Mix : 45VN21B2C  
Period : 25 Oct 2017 To 12 Jan 2018

Specified Strength	4500	Strength Type	Compressive Test	28 Day	
Number of Tests	21	Over Design Type	ACI 318 15-29 Tests	Within Test CofV Factor	1.209
Average Strength	5340	SD Correction Factor	1.070	Within Test SD	170
Standard Deviation	390	Corrected SD	420	Within Test CofV	3.18
Degree of Control	VERY GOOD	Corrected CofV	7.8	Within Test CofV Control	VERY GOOD
Coefficient of Variation	7.3	f'c + 1.34*s	5060	Batch-to-Batch SD	350
		f'c + 2.33*s - 500	4970	Batch-to-Batch CofV	6.57
		Required Strength	5060	Cementitious Content	661
Maximum f'c for Mix	4780	Safety Factor	280	Cementitious Efficiency	8.1

	Air Content %	Concrete Temp deg F	Slump in	Strength 28D psi	1D Str psi	3D Str psi	7D Str psi	28D Str psi
Count	21	20	21	21		18	21	21
Average	6.71	67	1.80	5340		3590	4160	5340
STDEV	0.96	5	0.75	390		600	380	390
COV%	14.2	7.2	41.9	7.4		16.6	9.2	7.4
Range Min	5.00	58	1.00	4720		2740	3260	4720
Range Max	8.00	76	3.00	5990		5110	4870	5990

Date	Sample	Air Content %	Concrete Temp deg F	Slump in	1D Str psi	3D Str psi	7D Str psi	28D Str psi
1/12/2018	63179	7.00	63	2.00		4200	4820	5990
1/5/2018	71352	6.00	58	1.00		3710	4310	5430
1/4/2018	71349	6.50	68	2.75		4200	4470	5920
12/19/2017	71335	7.00	64	1.00		2740	3690	5020
12/13/2017	90826	7.20	60	2.50		3170	4420	5660
12/12/2017	81897	8.00	71	1.00		3120	3990	4960
12/6/2017	32120	8.00	65	2.00		2940	3770	4790
	81887	7.50	68	2.50		3010	4210	5360
12/1/2017	20065056	5.40	72	1.50			3930	5170
11/27/2017	21981	7.60	76	3.00		3280	4030	4720
	32098	6.50	67	1.50		3410	3260	4990
11/22/2017	32092	5.50	65	1.00		4120	3870	5340
11/20/2017	81864	7.80	73	3.00		3620	4010	5240
	32083	5.80		1.00		3400	4250	5460
11/16/2017	32073	5.70	65	1.00		3390	3870	5130
11/15/2017	81853	6.50	68	3.00		3670	4450	5990
11/8/2017	20058031	5.00	71	1.25			4220	5090
	63016	8.00	61	1.00		5110	4440	5530
11/7/2017	63013	7.50	66	2.00		3250	4500	4920
11/6/2017	20057600	5.70	71	1.75			4000	5610
10/25/2017	P046	6.70	60	2.00		4290	4870	5890



627 Sheridan Boulevard • Lakewood, CO 80214  
303.975.9959 • office@westest.net

### LABORATORY TEST REPORT

**CLIENT:** Bestway  
**SOURCE:** Firestone Pit  
**SAMPLED BY:** Client  
**PROJECT:** Firestone Pit Aggregate Testing

**WesTest PROJECT NO.:** 569617  
**REPORT DATE:** January 9, 2018

<b>MATERIAL DESCRIPTION</b>	ASTM C 33 Fine Aggregate
<b>DATE SAMPLED</b>	November 14, 2017
<b>SAMPLE LOCATION</b>	Stockpile

**Aggregate Physical Property and Quality Tests (ASTM C 33, AASHTO M 6 Specifications)**

ASTM C 117 & C 136, AASHTO T 11 & T 27				ASTM C 128, AASHTO T 84, Bulk Specific Gravity = 2.60, Bulk Specific Gravity (SSD) = 2.63, Apparent Specific Gravity = 2.69, Absorption = 1.2%				ASTM C 88, AASHTO T 104, Sodium Sulfate Soundness, 5 Cycles				
SIEVE SIZE	% Passing	ASTM C 33 Spec.	AASHTO M 6 Spec.					SIEVE SIZE	GRADING OF ORIGINAL SAMPLE	WEIGHT BEFORE TEST, g	PERCENT PASSING AFTER TEST	WEIGHTED PERCENT LOSS
1"				<b>ASTM D 2419, AASHTO T 176,</b> Sand Equivalent Value = 83 Specification: 80 Min. (CDOT)				Minus #100	3			
3/4"								# 50 to # 100	8			
1/2"								<b>ASTM C 142, AASHTO T 112, Clay Lumps &amp; Friable Particles</b>  FINE AGG. = 0.0%, Specification: 3.0% Max.				# 30 to # 50
3/8"	100	100	100	# 16 to # 30	27	100.1	1.5					0.4
# 4	100	95 - 100	95 - 100	# 8 to # 16	33	100.0	1.9					0.6
# 8	92	80 - 100	80 - 100	<b>ASTM C 123, AASHTO T 113, Lightweight Particles in Aggregate</b>				# 4 to # 8	8	100.0	1.7	0.1
# 16	59	50 - 85	50 - 85					3/8" to # 4	0			
# 30	32	25 - 60	25 - 60					<b>TOTAL</b>				100
# 50	11	5 - 30	10 - 30	SAMPLE WT. (g)	LIQUID TYPE / SPECIFIC GRAVITY	LIGHTWEIGHT PARTICLES	SPEC.	SPECIFICATION:				
# 100	3	0 - 10	2 - 10					10 Max.				
# 200	1.9	0 - 3.0	0 - 2.0	361.7	ZnCl <sub>2</sub> /2.0	0.0%	0.5% Max.	<b>ASTM C 40, AASHTO T 21, Organic Impurities:</b> Less than Organic Plate No. 1 Specification: Organic Plate No. 3 or Less				
Fineness Modulus	3.03	2.3 - 3.1	2.3 - 3.1	361.7	ZnBr <sub>2</sub> /2.4	0.0%	3.0% Max.					

**COMMENTS:**

TABLE 1

December 8, 2017

Bestway Concrete  
455 W. 115<sup>th</sup> Avenue Unit 1  
Northglenn, CO 80234

Attention: Mr. Dan Bentz

Subject: Laboratory Test Results  
ASTM C 1260  
Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)  
ASTM C 33 Fine Aggregate  
Intermediate Aggregate  
ASTM C 33 Size No. 57/67 Coarse Aggregate  
Firestone Pit  
WesTest Project No. 569617

Gentlemen:

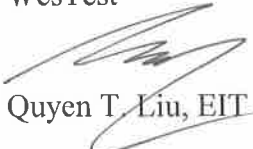
Included as Figures 1 and 2 are the results of potential alkali reactivity testing (mortar bar method), performed on aggregate sampled from the above-referenced source on November 14, 2017. The aggregate was prepared and tested in general accordance with ASTM Procedures. ASTM C 1260 defines the potential of an aggregate for deleterious expansion as follows:

<u>Test Expansion</u>	<u>Classification</u>	<u>Potential for Deleterious ASR</u>
< 0.10%	Innocuous	Low
0.10% to 0.20%	Inconclusive	Not Predictable
> 0.20%	Deleterious	High

Based on the test results of 0.06% and 0.08% expansion at 14 days in solution, 16 days after casting, the potential for deleterious alkali-silica behavior of this aggregate in concrete is considered Low.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,  
WesTest

  
Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



627 Sheridan Boulevard • Lakewood, CO 80214  
303.975.9959 • office@westest.net

## LABORATORY TEST REPORT

POTENTIAL ALKALI REACTIVITY OF AGGREGATES  
(MORTAR-BAR METHOD)  
ASTM C 1260

CLIENT: Bestway Concrete  
PROJECT NO.: 569617

REPORT DATE: January 2, 2018  
SAMPLE DATE: November 14, 2017  
SAMPLE ID: 5696B

AGGREGATE: SOURCE: Firestone Pit  
SIZE: ASTM C 33 Fine Aggregate  
COMMENTS: Aggregate graded as per Section 8.2, Table 1

CEMENT: SOURCE: Holcim  
TYPE: I/II  
AUTOCLAVE EXPANSION: -0.01%  
ALKALIS CONTENT: 0.53% (as Na equivalent)  
COMMENTS: Cement data provided by Holcim.

MIX WATER: W/C RATIO: 0.47

EFFECTIVE GAUGE LENGTH = 250 mm

Specimen	11/22/17	11/23/17	11/27/17		11/30/17		12/4/17		12/7/17		12/11/17		12/14/17		12/18/17		12/21/17	
	Initial	Zero	4 Days		7 Days		11 Days		14 Days		18 Days		21 Days		25 Days		28 Days	
	Comparator Reading	Comparator Reading	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change
A	-0.320	-0.174	-0.150	0.01%	-0.120	0.02%	-0.062	0.04%	-0.022	0.06%	0.016	0.08%	0.060	0.09%	0.104	0.11%	0.142	0.13%
B	2.146	2.290	2.314	0.01%	2.340	0.02%	2.396	0.04%	2.438	0.06%	2.476	0.07%	2.520	0.09%	2.562	0.11%	2.600	0.12%
C	1.978	2.124	2.150	0.01%	2.180	0.02%	2.232	0.04%	2.272	0.06%	2.336	0.08%	2.372	0.10%	2.394	0.11%	2.430	0.12%
AVERAGE		1.413	1.438	0.01%	1.467	0.02%	1.522	0.04%	1.563	0.06%	1.609	0.08%	1.651	0.09%	1.687	0.11%	1.724	0.12%

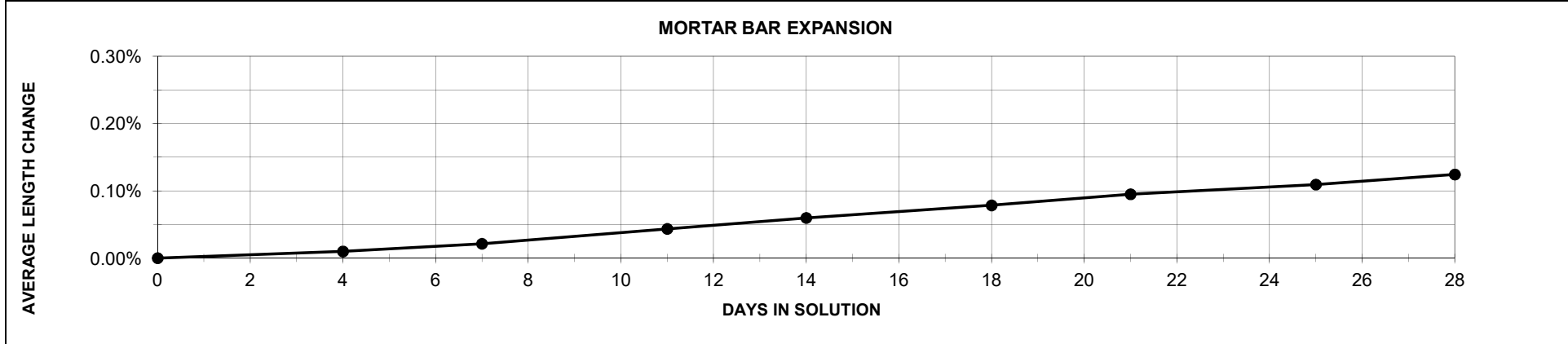


FIGURE 1

December 8, 2017

Bestway Concrete  
455 W. 115<sup>th</sup> Avenue Unit 1  
Northglenn, CO 80234

Attention: Mr. Dan Bentz

Subject: Laboratory Test Results  
ASTM C 1567, Potential Alkali-Silica Reactivity of Combinations of  
Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)  
ASTM C 33 Fine Aggregate, Firestone Pit  
ASTM C 33 Size No. 57/67 Coarse Aggregate, Church McKay Pit  
Mountain Type I/II/V Cement  
Headwaters Bridger Class F Fly Ash  
WesTest Project No. 569717

Gentlemen:

Enclosed as Figure 1 are the results of potential alkali-silica reactivity of combinations of cementitious materials and aggregate (accelerated mortar-bar method), performed on aggregate sampled from the above-referenced sources on November 14, 2017. Figure 1 represents the test results for aggregate blended with Mountain Type I/II/V cement using 20% Headwaters Bridger Class F fly ash as cement replacement. The aggregate was prepared and tested in general accordance with ASTM Procedures. ASTM C 1567 defines the potential of an aggregate for deleterious expansion as follows:

<u>Test Expansion</u>	<u>Classification</u>	<u>Potential for Deleterious ASR</u>
< 0.10%	Innocuous	Low
> 0.10%	Deleterious	Potentially Deleterious

Based on the test results of 0.07% expansion at 14 days in solution, 16 days after casting, the potential for deleterious alkali-silica behavior of this aggregate in concrete is considered low.

If you have any questions on the data presented, please contact us at your convenience.

Sincerely,  
WesTest

  
Quyen T. Liu, EIT



Reviewed by:

Dylan A. Hullinger, P.E.



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**LABORATORY TEST REPORT**  
POTENTIAL ALKALI-SILICA REACTIVITY  
OF COMBINATIONS OF CEMENTITIOUS MATERIALS AND AGGREGATE  
(ACCELERATED MORTAR-BAR METHOD)  
ASTM C 1567

CLIENT: Bestway Concrete  
PROJECT NO.: 569717

REPORT DATE: December 8, 2017  
SAMPLE DATE: November 14, 2017  
SAMPLE ID: 5697A

**AGGREGATE:**  
SOURCE: Church McKay and Firestone Pits  
SIZE: ASTM C 33 Fine Aggregate, Firestone Pit  
SIZE: ASTM C 33 Size No. 57/67 Coarse Aggregate, Church McKay Pit  
COMMENTS: Aggregates graded as per Section 8.2, Table 1 with 62% 57/67 Coarse Aggregate and 38% Fine Aggregate.

**CEMENT:**  
SOURCE: Mountain  
TYPE: I/II/V  
AUTOCLAVE EXPANSION: -0.03%  
ALKALIS CONTENT: 0.56%  
COMMENTS: Cement data provided by Mountain Cement

**POZZOLANS:**  
SOURCE: Bridger Headwaters  
CLASS: F Fly Ash  
REPLACEMENT: 20%

**MIX WATER:**  
W/C RATIO: 0.47

**ADMIXTURES:** None

EFFECTIVE GAUGE LENGTH = 250 mm

Specimen	11/22/17	11/23/17	11/27/17		11/30/17		12/4/17		12/7/17	
	Initial	Zero	4 Days		7 Days		11 Days		14 Days	
	Comparator Reading	Comparator Reading	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change	Comparator Reading	Length Change
A	-0.092	0.060	0.088	0.01%	0.126	0.03%	0.184	0.05%	0.254	0.08%
B	-0.246	-0.092	-0.062	0.01%	-0.024	0.03%	0.026	0.05%	0.092	0.07%
C	-0.098	0.058	0.086	0.01%	0.124	0.03%	0.170	0.04%	0.232	0.07%
AVERAGE		0.009	0.037	0.01%	0.075	0.03%	0.127	0.05%	0.193	0.07%

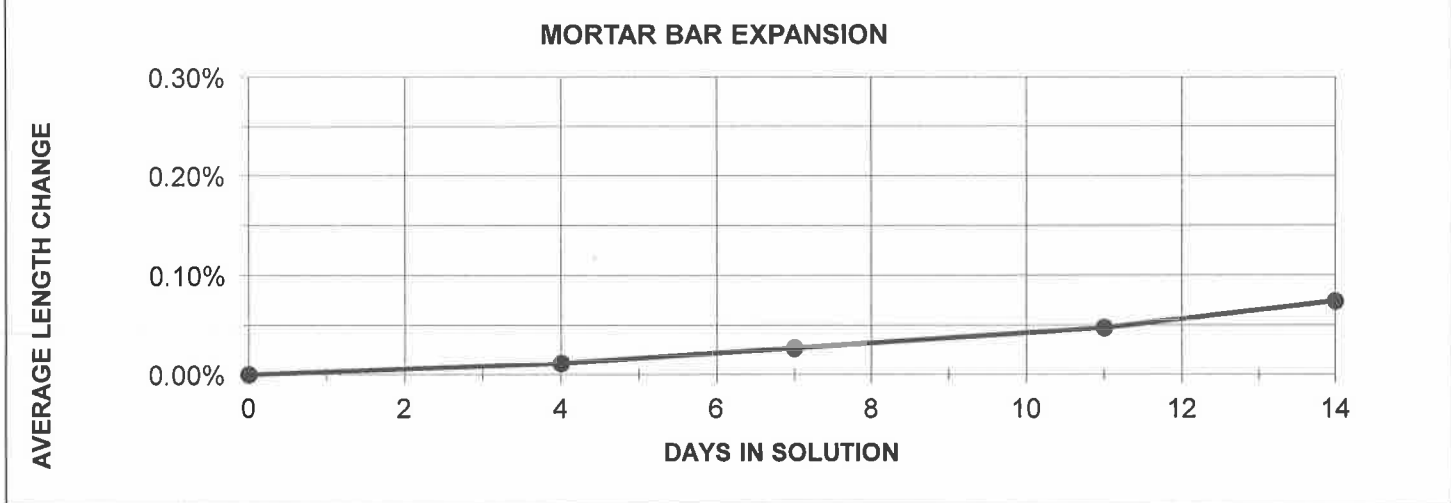


FIGURE 1





# Certificate of Test

ASTM C150 Type V Low-Alkali  
AASHTO M85 Type V Low-Alkali

May 9, 2018  
Lot 91-120

**C150 Chemical Requirements – Table 1**

Item	Spec Limit	Result
Al <sub>2</sub> O <sub>3</sub>	N/A	3.6
Fe <sub>2</sub> O <sub>3</sub>	N/A	3.2
MgO	6.0 Max	1.0
SO <sub>3</sub>	2.3*	3.4
L.O.I.	3.5 Max	2.2
Insoluble Residue	1.5 Max	0.72

**C150 Physical Requirements – Table 3**

Item	Spec Limit	Result
Blaine Specific Surface, m <sup>2</sup> /kg	260 Min	385
Air Content of Mortar, Vol %	12 Max	7.3
Autoclave Expansion, %	0.80 Max	0.00
Vicat Initial Time of Set, minutes	45 Min	85
Vicat Final Time of Set, minutes	375 Max	180
Compressive Strength, psi:		
	3 Days	1740 Min 3630
	7 Days	2760 Min 4690
	Lot 60-90 28 Days	3050 Min 6240

\*Does not apply. In compliance with Footnote D, Table 1, ASTM Standard Specification C150 and AASHTO Standard Specification M85.

**Compound Composition**

Item	Spec Limit	Result
C <sub>3</sub> A, %	5 Max**	4
Equivalent Alkalies, %	0.60 Max	0.55
C <sub>4</sub> AF + 2•C <sub>3</sub> A	25 Max**	19
Inorganic Processing Addt's, %	5.0 Max	0
CaCO <sub>3</sub> in Limestone, %	70 Min	92.1
Limestone Additions	5.0 Max	3.9
C1038 Mortar Bar Expansion, %	0.020% Max	0.007

\*\*Does not apply when C452 sulfate resistance limit in Table 4 is used, see below

**ASTM C150 Optional Requirements – Table 4**

Item	Spec Limit	Result
C452 Sulfate Resistance, 14 Days, max, % expansion	0.040 max	0.021

This cement has been sampled and tested in accordance with ASTM standard methods and procedures. Cement analysis are reported as oxides, in accordance with ASTM Test Method C114. This cement is manufactured at our Laramie, Wyoming facility. All test results are certified to comply with the type and specification designated. We are not responsible for improper use or workmanship.

Bob Kersey, Chief Chemist



AASHTO Accredited Since 1996

## ASTM C618 Testing of Jim Bridger Fly Ash

**Sample Date:** 2/23 - 3/1/18  
**Sample Type:** composite  
**Sample ID:** BR-008-18

**Report Date:** 4/30/2018  
**MTRF ID:** 771JB

Chemical Analysis	Results	ASTM Limit Class F/C
Silicon Dioxide (SiO <sub>2</sub> )	<u>64.87</u> %	
Aluminum Oxide (Al <sub>2</sub> O <sub>3</sub> )	<u>17.94</u> %	
Iron Oxide (Fe <sub>2</sub> O <sub>3</sub> )	<u>3.90</u> %	
Sum (SiO <sub>2</sub> +Al <sub>2</sub> O <sub>3</sub> +Fe <sub>2</sub> O <sub>3</sub> )	<u>86.71</u> %	70.0/50.0 min
Sulfur Trioxide (SO <sub>3</sub> )	<u>0.80</u> %	5.0 max
Calcium Oxide (CaO)	<u>4.22</u> %	
Magnesium Oxide (MgO)	<u>1.51</u> %	
Sodium Oxide (Na <sub>2</sub> O)	<u>2.51</u> %	
Potassium Oxide (K <sub>2</sub> O)	<u>1.30</u> %	
Moisture	<u>0.04</u> %	3.0 max
Loss on Ignition	<u>0.43</u> %	6.0 max

### Physical Analysis

Fineness, % retained on 45- $\mu$ m sieve	<u>23.60</u> %	34 max
Strength Activity Index - 7 or 28 day requirement		
7 day, % of control	<u>94</u> %	75 min
28 day, % of control	<u>97</u> %	75 min
Water Requirement, % control	<u>95</u> %	105 max
Autoclave Soundness	<u>0.01</u> %	0.8 max
Density	<u>2.36</u>	

**Boral 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.**

**The reported results pertain only to the samples or lot(s) tested.  
This report cannot be reproduced without permission from Boral Resources.**

  
Doug Rhoades, CET  
Facility Manager



# DARAVAIR® 1000

## Air-entraining admixture

ASTM C260

### Product Description

Daravair® 1000 is a liquid air-entraining admixture that provides freeze thaw resistance, yield control, and finishability performance across the full range of concrete mix designs. Daravair 1000 is a clean, light orange product designed to generate specification-quality air systems. Based on a high-grade saponified rosin formulation, Daravair 1000 is chemically similar to vinsol-based products, but with increased purity and supply dependability. Daravair 1000 weighs approximately 8.5 lbs/gal (1.02 kg/L). Daravair 1000 does not contain intentionally added chloride.

### Uses

Daravair 1000 air-entraining admixture may be used wherever the purposeful entrainment of air is required by concrete specifications. Formulated to perform across the entire spectrum of production mixes, Daravair 1000 generates quality, freeze-thaw resistant air systems in concrete conditions that include the following:

- Low slump
- Paving
- Central mix
- Extruded slip form
- Mixes containing hot water and accelerators
- Precast
- High cement factor
- Fly ash and slag
- Superplasticizers
- Manufactured sands

### Product Advantages

- Rapid air build suitable for short mix cycles
- Can be used in wide spectrum of mix designs

### Performance

Air is incorporated into the concrete by the mechanics of mixing and stabilized into millions of discrete semi-microscopic bubbles in the presence of a specifically designed air-entraining admixture such as Daravair 1000. These air bubbles act much like flexible ball bearings increasing the mobility, or plasticity and workability of the concrete. This can permit a reduction in mixing water with no loss of slump. Placeability is improved. Bleeding, plastic shrinkage and segregation are minimized.

Through the purposeful entrainment of air, Daravair 1000 markedly increases the durability of concrete to severe exposures particularly to freezing and thawing. It has also demonstrated a remarkable ability to impart resistance to the action of frost and de-icing salts as well as sulfate, sea and alkaline waters.

### Addition Rates

There is no standard addition rate for Daravair 1000. The amount to be used will depend upon the amount of air required for job conditions, usually in the range of 4% to 8%. Typical factors which might influence the amount of air-entraining admixture required are temperature, cement, sand gradation and the use of extra fine materials such as fly ash and microsilica. Typical Daravair 1000 addition rates range from ½ to 3 fl oz/100 lbs (30 to 200 mL/100 kg) of cement. Pretesting of concrete should be performed to confirm dosage rates required to achieve desired concrete performance.

The air-entraining capacity of Daravair 1000 is usually increased when other concrete admixtures are contained in the concrete, particularly water-reducing admixtures and water-reducing retarders. This may allow up to ⅓ reduction in the amount of Daravair 1000 required.

### Concrete Mix Adjustment

Entrained air will increase the volume of the concrete making it necessary to adjust the mix proportions to maintain the cement factor and yield. This may be accomplished by a reduction in water requirement and aggregate content.

## Compatibility with Other Admixtures and Batch Sequencing

Daravair 1000 is compatible with most GCP admixtures as long as they are added separately to the concrete mix. In general, it is recommended that Daravair 1000 be added to the concrete mix near the beginning of the batch sequence for optimum performance, preferably by “dribbling” on the sand. Different sequencing may be used if local testing shows better performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations. Daravair 1000 should not be added directly to heated water.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. Please consult your GCP Applied Technologies representative for guidance.

## Packaging & Handling

Daravair 1000 is available in bulk, delivered by metered tank trucks, totes and drums.

Daravair 1000 will freeze at about 30 °F (-1 °C) but its air-entraining properties are completely restored by thawing and thorough mechanical agitation.

## Dispensing Equipment

A complete line of accurate automatic dispensing equipment is available. These dispensers can be located to discharge into the water line, the mixer, or on the sand.

## Specifications

Concrete shall be air entrained concrete, containing 4% to 8% entrained air. The air contents in the concrete shall be determined by the pressure method (ASTM Designation C231) or volumetric method (ASTM Designation C173). The air-entraining admixture shall be a completely neutralized rosin solution, such as Daravair 1000, as manufactured by GCP Applied Technologies, or equal, and comply with Standard Specification for Air-Entraining Admixtures (ASTM Designation C260). The air-entraining admixture shall be added at the concrete mixer or batching plant at approximately ½ to 3 fl oz/100 lbs (30 to 200 mL/100 kg) of cement, or in such quantities as to give the specified air contents.

gcpat.com | North America Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

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GCP0083

AIR-7-1216



**gcp** applied technologies

# DARACEM<sup>®</sup> 55

## Mid-range water-reducing admixture

ASTM C494 Type A and F

### Product Description

Daracem<sup>®</sup> 55 is a mid-range water reducer specifically formulated to produce concretes with dramatically enhanced finishing characteristics and normal setting times. Effective through a wide addition rate range, Daracem 55 combines the benefits of normal and high-range water reducers allowing for the ultimate control of the concretes placing and finishing properties.

Daracem 55 is an aqueous solution of complex organic compounds, each of which contributes uniquely to the concretes final properties. It contains both patented dispersing and finishability agents that provide performance superior to conventional water-reducing products. Daracem 55 is also formulated with a catalyst which promotes more complete hydration of Portland cement to assure superior strength performance. It is manufactured under rigid controls which provide uniform, predictable performance. Daracem 55 contains no calcium chloride. Daracem 55 is supplied as a dark brown, low viscosity liquid, weighing approximately 10.7 lbs/gal (1.28 kg/L).

### Uses

Daracem<sup>®</sup> 55 produces a concrete with lower water content, improved placement properties and enhanced finishability. It yields a less permeable and more durable concrete. Daracem 55 is used in ready-mix, job site and concrete paving plants for normal and lightweight concrete, in block and precast. It imparts a "slickness" to the surface of the concrete making it most appropriate for concrete flatwork as well as slip form work. Daracem 55 is also particularly effective in lean or fly ash and slag compensated mixes.

### Advantages

Daracem 55 offers significant advantages over conventional water reducers. Field work has consistently demonstrated:

- **Ultimate workability and finishability**

The exceptional water-reducing capabilities allow for concrete

production at higher slumps with better water retention and internal cohesiveness, providing a less "sticky" concrete with improved placement properties. Formulated with proven finishing enhancing components, Daracem 55 controls bleeding while bringing the mortar to the surface. Finishers have stated that the concrete has improved trowelability. The influence of Daracem 55 on the finishability of lean mixes has been particularly noticeable. Floating and troweling, by machine or by hand, easily imparts a smooth, close tolerance surface with less machine time and labor.

- **Neutral setting times**

Formulated with a set control agent, Daracem 55 provides normal setting characteristics throughout its addition rate range. This allows for increased water reduction and increased slump without significantly extended setting times. It also allows the flexibility to vary addition based on specific job and weather requirements.

- **Superior strength performance**

The water reduction properties, up to 12%, and dispersion characteristics allow the production of lower water to cement ratio concretes and more complete hydration. The combined effect is increased compressive and flexural strengths at all ages.

### Addition Rates

The addition rate range of Daracem 55 is 3 to 15 fl oz/100 lbs (190 to 980 mL/100 kg) of cement. Typically excellent results are achieved between 5 to 7 fl oz/100 lbs (325 to 460 mL/100 kg) of cement. Optimum addition depends on the other concrete mixture components, job conditions and desired performance characteristics.

### Product Advantages

- Ultimate workability and finishability
- Neutral setting times
- Superior strength performance

## Compatibility with Other Admixtures and Batch Sequencing

Daracem 55 is compatible with most GCP admixtures as long as they are added separately to the concrete mix. In general, it is recommended that Daracem 55 be added to the concrete mix near the beginning of the batch sequence but after the cement and water are combined for optimum performance. Different sequencing may be used if local testing shows better performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to ensure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. For concrete that requires air entrainment, the use of an ASTM C260 air-entraining agent (such as Daravair® or Darex® product lines) is recommended to provide suitable air void parameters for freeze-thaw resistance.

## Packaging & Handling

Daracem 55 is available in bulk, delivered in metered tank trucks and drums.

Daracem 55 contains no flammable ingredients. It will freeze at approximately 15°F (-9°C) but will return to full strength after thawing and thorough mechanical agitation.

## Dispensing Equipment

A complete line of accurate, automatic dispensing equipment is available. Daracem 55 may be added to the concrete mix on the sand or in the batch water.

## Specifications

Concrete shall be designed in accordance with *Standard Recommended Practice for Selecting Proportions for Concrete*, ACI 211.

The water-reducing admixture shall be a mid-range water-reducing admixture such as Daracem 55 as manufactured by GCP Applied Technologies, or its equivalent. The admixture shall not contain calcium chloride. It meets the requirements of *Specification for Chemical Admixtures for Concrete* ASTM Designation C494 as a Type A and Type F admixture. Certification of compliance shall be made available on request. The admixture shall be considered part of the total mixing water.

The admixture shall be delivered as a ready-to-use liquid product and shall require no mixing at the batching plant or job site.

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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.

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GCP0083

DW-12-1216



**gcp** applied technologies

# ZYLA® 630

## Water-reducing admixture

ASTM C494 Type A and D

### Product Description

ZYLA® 630 water-reducing admixture is a proprietary formulation incorporating highly purified specialty organic chemicals. ZYLA 630 promotes more complete hydration of Portland cement and has no effect on concrete air entrainment.

The ZYLA product line of water reducers is specially formulated to have a synergistic effect with polycarboxylate-based mid-range and high-range water reducers that improve flat-work finishability. This product contains no intentionally added chloride and as such is essentially chloride free. It is manufactured under rigid controls that provide uniform, predictable performance. ZYLA 630 is supplied as a light brown, low viscosity liquid, and is ready-to-use as received. One gallon weighs approximately 9.1 lbs (1.1 kg/L).

### Uses

ZYLA 630 is used to produce concrete mixes with lower water content (typically 3% to 10% reduction), greater plasticity and higher compressive strengths. ZYLA 630 is suitable for normal weight and light weight concrete in ready-mix, precast and prestressed applications.

### Finishability

The unique chemistry of ZYLA 630 positively impacts the finishability of concrete by providing a creamier and more homogenous texture, with more uniform and increased bleed rate relative to traditional lignin-based water reducers. The influence of ZYLA 630 on the finishability of lean mixes has been particularly noticeable. Floating and troweling, by machine or hand, imparts a smooth, close tolerance surface.

### Product Advantages

- No impact on concrete air content
- Better control of water reduction and setting times as compared to traditional lignin-based water reducers
- Synergistic performance of polycarboxylate-based mid-range and high-range water reducers, which includes water reduction, concrete strength and air control
- In the hardened state, improves the compressive and flexural strengths at all ages of concrete versus traditional lignin-based water reducers

### Addition Rates

The addition rate range of 3 to 5 fl oz/100 lbs (195 to 325 mL/100 kg) of cement or cementitious is typical for most applications. However addition rates of 2 to 7 fl oz/100 lbs (130 to 455 mL/100 kg) of cement or cementitious may be used if local testing shows acceptable performance. Pretesting is required to determine the appropriate addition rate for desired performance. The optimum addition rate depends on the other concrete mixture components, job conditions, and desired performance characteristics.

### Compatibility with Other Admixtures and Batch Sequencing

ZYLA 630 is compatible with most GCP admixtures as long as they are added separately to the concrete mix, usually through the water holding tank discharge line. In general, it is recommended that ZYLA 630 be added to the concrete mix near the end of the batch sequence for optimum performance. Different sequencing may be used if local testing shows better performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. For concrete that requires air entrainment, the use of an ASTM C260 air-entraining agent (such as Daravair or Darex product lines) is recommended to provide suitable air void parameters for freeze-thaw resistance. Please consult your GCP Applied Technologies representative for guidance.

## Packaging & Handling

ZYLA 630 is available in bulk, delivered by metered tank trucks, in totes, and in drums.

ZYLA 630 will freeze at about 28°F (-2°C), but will be completely uniform after thawing and thorough agitation.

## Dispensing Equipment

A complete line of accurate, automatic dispensing equipment is available. ZYLA 630 may be introduced to the mix through the water holding tank discharge line. The ZYLA product line is formulated to be free of sediment.

## Specifications

Concrete shall be designed in accordance with *Standard Recommended Practice for Selecting Proportions for Concrete*, ACI 211.

The water-reducing admixture shall be ZYLA 630, as manufactured by GCP Applied Technologies, or equal. The admixture shall not contain calcium chloride as a functional ingredient. ZYLA 630 will not promote corrosion of reinforcing steel embedded in concrete. It shall be used in strict accordance with the manufacturers' recommendations. The admixture shall comply with ASTM Designation C494, Type A and D water-reducing admixtures. Certification of compliance shall be made available on request.

The admixture shall be delivered as a ready-to-use liquid product and shall require no mixing at the batching plant or job site.

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GCP0083

ZYLA-630-1016



**gcp** applied technologies

# Sinta™ F19 (formerly Grace Fibers™)

## Synthetic fiber for concrete

ASTM C1116, ASTM C94

### Product Description

Sinta™ F19 are synthetic fibers for concrete, manufactured from 100% virgin polypropylene in collated, fibrillated form. Designed specifically for use in concrete, they are alkali resistant, non-absorptive and completely noncorrosive. Their use protects concrete from stresses which cause cracking while it is most vulnerable during the first 24 hours after placement. Sinta F19 comply with ASTM Designation C1116, *Standard Specification for Fiber-Reinforced Concrete and Shotcrete, Type III Synthetic Fiber-Reinforced Concrete or Shotcrete*. They are available in 3/4 in. (19 mm).

### Uses

Sinta F19 may be used in any application where decreased plastic shrinkage cracking and improved durability are desired. Specifically, such applications include but are not limited to, slabs on grade, pavements, overlays, sloped walls, pools, shotcrete, stucco, precast and prestressed products. It is suggested that this product be used in conjunction with properly compacted base materials and jointing in accordance with ACI guidelines and standards.

Sinta F19 may be used as an alternative to welded wire fabric, depending on the application. Sinta F19 may not be used as a replacement for structural or post-crack control steel reinforcement. For temperature or shrinkage post-crack control, please consult a GCP Applied Technologies representative regarding our STRUX® synthetic macro fibers.

### Advantages

Sinta F19 uniformly distribute multi-dimensionally throughout the concrete mixture. The small fibrillated fibers mechanically lock in the fresh concrete matrix providing reinforcement for the mixture

while its tensile strength is the weakest. This reinforcement reduces the formation of plastic shrinkage cracking that may otherwise permanently weaken the resulting concrete. The concrete permeability is decreased, while the surface characteristics, impact and toughness properties are improved. Together these effects work synergistically to produce a long-term better quality, more durable and serviceable concrete.

### Addition Rates

Sinta F19 may be added to concrete at any point during the batching or mixing process. Sinta F19 may be added to the aggregate during weighing or charging, or to the central mixer or truck before, during, or after charging. The load must be mixed at high speed for 5 minutes, or 70 revolutions, after the addition of the Sinta F19 to ensure uniform distribution. The standard range of addition for Sinta F19 is 3/4 to 3 lbs/yd<sup>3</sup> (450 to 1800 g/m<sup>3</sup>) of concrete. Typically, 1 1/2 lbs/yd<sup>3</sup> (900 g/m<sup>3</sup>) of Sinta F19 provides excellent results. Higher addition rates may be used to produce concrete when special properties are required.

### Product Advantages

- Reduces plastic shrinkage cracking and improves durability
- Protects concrete from stresses that cause cracking
- Provides cost effective control of plastic shrinkage
- Provides overall higher quality of concrete



## Compatibility with Other Admixtures

Sinta F19 are compatible with all GCP admixtures. Their action in concrete is purely mechanical and will not affect the hydration process. Each admixture should be added separately.

## Packaging & Handling

Sinta F19 are available in convenient Concrete-Ready™ Bags which are added, unopened, to the truck drum or central mixer. The specially designed cellulose fiber bag disintegrates and disperses its contents of Sinta F19, throughout the mix.

## Specifications

Fibers shall be ¾ in. (19 mm) collated, fibrillated polypropylene fibers as supplied by GCP Applied Technologies, Cambridge, MA 02140. Required dosage rate shall be as specified by the design engineer or architect. Sinta F19 shall be used in strict accordance with the supplier's recommendations and within time as specified in ASTM C94. The fibers shall comply with ASTM Designation C1116 Type III 4.1.3 and with applicable building codes. Certification of compliance shall be made available on request. Standard ACI 302 procedures for placing, finishing and curing shall be followed when using Sinta F19.

## References

### Building Codes—

BOCA National Building Codes, SBCCI Standard Building Code, ICBO Uniform Building Code and all supplements as adopted by the Council of American Building Officials

### Fire Classifications—

*Underwriters Laboratories (UL) on Series D700 and D800 metal deck assemblies*

### American Concrete Institute (ACI)—

ACI 544 *State of the Art Report of Fiber-Reinforced Concrete*

ACI 302 *Guide for Concrete Floor and Slab Construction*

### American Society of Testing and Materials (ASTM)—

ASTM C1116 *Standard Specification for Fiber-Reinforced Concrete and Shotcrete*

ASTM C1579 *Standard Test Method for Evaluating Plastic Shrinkage Cracking of Restrained Fiber Reinforced Concrete (Using a Steel Form Insert)*

ASTM C94 *Standard Specification for Ready-Mixed Concrete*

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GCP0083

SF-001-0817



**gcp** applied technologies

# RECOVER®

## Hydration stabilizer

ASTM C494 Type D

### Product Description

Recover® is a ready-to-use aqueous solution of chemical compounds specifically designed to stabilize the hydration of Portland cement concretes. The ingredients are factory pre-mixed in exact proportions under strict quality control to provide uniform results. One gallon weighs approximately 9.6 lbs (1.15 kg/L).

### Uses

Recover is used to stabilize mixer wash water and returned or leftover concrete for extended periods, allowing for use of the materials when specified or allowed. It is also used where controlled extended set of concrete is needed. It is the concrete user's responsibility to determine if leftover, returned or extended-set concrete is specified or allowed.

### Wash Water

For wash water applications, Recover is used to eliminate the need to discharge wash water from the mixer. This allows the wash water to be used as mix water in the next batch of concrete produced and prevents the residual plastic concrete from hardening. Stabilization of up to 96 hours is possible depending on dosage rate.

### Returned Concrete

For returned or leftover concrete, Recover is used to prevent plastic concrete from reaching initial set. This allows the concrete to be stored in a plastic state and then used when specified or allowed. The use of this concrete may require the addition of freshly batched concrete and/or an accelerator such as Daracel® or PolarSet®.

Stabilization of concrete for up to 96 hours is possible depending on dosage rate. Use prevents the waste of unused concrete.

### Product Advantages

- Eliminates the need to discharge wash water from the mixer
- Prevents the waste of unused concrete
- Provides predictable extended set for continuous placement on mass concrete and tremie projects, or on long hauls to remote sites

### Set Time Control

Recover is also used in situations where a controlled set time extension is required. Examples include: extended hauls, large continuous pours or pre-batching of concrete for later use.

### Performance

Recover stabilizes the hydration process of Portland cement preventing it from reaching initial set. This stabilization is not permanent and is controlled by dosage rate. For wash water, the Recover treated water is mixed or sprayed in a specific manner to thoroughly coat the interior of the mixer. The water is used as mix water in the next batch of concrete produced, which then scours the unhardened material from the interior of the mixer. Stabilization of returned or leftover concrete with Recover maintains the plasticity of the concrete for the desired storage duration. This stabilized concrete then resumes normal hydration when the Recover dosage effects subside, or when it is activated by the addition of fresh concrete and/or an accelerator. The result can be concrete with normal plastic and hardened properties.

### Addition Rates

Addition rates of Recover for wash water range from 6 to 128 fl oz (180 to 3800 mL) per treatment. The amount used will depend on the specific materials involved, mixer type and stabilization period. Addition rates for returned or leftover concrete will range from 3 to 128 fl oz/100 lbs (195 to 8350 mL/100 kg) of cement. The amount used will depend on the specific materials involved, concrete age, temperature conditions and stabilization period. For applications requiring set time extensions well in excess of 4 hours, Recover may be used at addition ranges from 5 to 50 oz/100 lbs (325 to 3260 mL/100 kg) of cement. For use as a traditional ASTM Type D retarder, Recover may be used at addition rates of 2 to 6 oz/100 lbs (130 to 390 mL/100 kg) of cement. Proper dosage rate selection can only be achieved through pretesting. Consult your local GCP Applied Technologies admixture representative.

## Compatibility with Other Admixtures and Batch Sequencing

Recover is compatible with most GCP admixtures as long as it is added separately to the concrete mix, usually through the water holding tank discharge line. In general, it is recommended that Recover be added to the concrete mix near the end of the batch sequence for optimum performance. Different sequencing may be used if local testing shows better performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to ensure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. For concrete that requires air entrainment, the use of an ASTM C260 air entraining agent (such as Daravair® or Darex® product lines) is recommended to provide suitable air void parameters for freeze-thaw resistance. Please consult your GCP Applied Technologies representative for guidance.

## Packaging & Handling

Recover is available in bulk, delivered by metered tank trucks, totes and drums.

Recover will freeze, but will return to full effectiveness after thawing and thorough mechanical agitation.

## Dispensing Equipment

A complete line of GCP dispensing equipment is available for Recover. This includes the Reach 360TM System which uses an innovative spray wand technology to simplify wash water procedures.

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GCP0083

RECOVER-5-1216



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# DARASET<sup>®</sup> 400

## Set-accelerating admixture

ASTM C494 Type C

### Product Description

Daraset<sup>®</sup> 400 is a non-corrosive, non-chloride admixture for concrete. It accelerates cement hydration resulting in shortened setting times and increased early compressive and flexural strengths. Daraset 400 does not contain calcium chloride and is formulated to comply with ASTM C494 Type C, and can be used at any dosage to comply with ACI 318 guidelines for chloride content of concrete. Daraset 400 weighs approximately 11.5 lbs/gal (1.38 kg/L).

### Uses

Daraset<sup>®</sup> 400 set accelerator may be used wherever it is desirable to reduce the setting time of concrete and/or to increase its early compressive and flexural strengths. For mixes designed with pozzolans, such as fly ash or slag, Daraset 400 set accelerator can help offset the retarding effects of these materials, especially in cooler temperatures.

In cold weather, Daraset 400 may be used to reduce the time that it takes the concrete to set prior to finishing. Typical results show that when concrete containing Daraset 400 is poured at 50°F (10°C), the concrete will set up to 2 hours faster than the reference concrete.

When used in the manufacture of precast concrete, Daraset 400 speeds the concrete's strength development allowing for earlier form removals and more efficient production. Daraset 400 can also be used in masonry mortar to obtain higher early strengths and accelerated setting time effects.

### Special Feature

Daraset 400 set accelerator provides setting time results and early strength development similar to that provided by calcium chloride, but without the potential corrosive effects. Daraset 400 can, therefore, at recommended dosage rates, safely be used where the potential corrosion of embedded or stressed steel must be avoided. It can also be used in concrete that is to be placed on steel clad or zinc coated steel decks where corrosion must be similarly avoided.

### Performance

In concrete mixtures, Daraset 400 accelerates the chemical reaction between Portland cement and water. It speeds up the formation of gel—the binder that bonds concrete aggregates together. Accelerated gel formation in turn shortens the setting time of concrete, compensates for the set-slowing effects of cooler weather and contributes to the development of higher early strengths.

### Product Advantages

- Accelerates setting time
- Increases early compressive and flexural strengths
- Offsets the retarding effects of pozzolans such as slag or fly ash
- Non-corrosive



## Addition Rates

The amount of Daraset 400 used will depend on specific job conditions, on local materials and on the degree of set acceleration and early strength development required. Typical addition levels range from 10 to 60 fl oz/100 lbs (650 to 3910 mL/100 kg) of cement. Higher dosage rates may be used for select applications after consulting with your local GCP Applied Technologies sales representative.

## Compatibility with Other Admixtures and Batch Sequencing

Daraset 400 is compatible with most GCP admixtures as long as they are added separately to the concrete mix, usually through the water holding tank discharge line. In general, it is recommended that Daraset 400 be added to the concrete mix near the end of the batch sequence for optimum performance. Different sequencing may be used if local testing shows better performance. Please see GCP Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations.

Pretesting of the concrete mix should be performed before use, as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. For concrete that requires air entrainment, the use of an ASTM C260 air-entraining agent (such as Daravair® or Darex® product lines) is recommended to provide suitable air void parameters for freeze-thaw resistance. Please consult your GCP Applied Technologies representative for guidance.

## Packaging & Handling

Daraset 400 is currently available in bulk quantities by GCP metered systems, or in totes and drums.

Daraset 400 freezes at approximately -10°F (-23°C), but its set acceleration, strength gain and non-corrosive properties are completely restored by thawing and thorough agitation.

## Dispensing Equipment

A complete line of accurate dispensers is available. While Daraset 400 may be added to the mix on the sand or in the water, for greatest effectiveness, we recommend Daraset 400 be added at the end of the batch cycle.

Similar to all concrete admixtures, Daraset 400 should not come into contact with other admixtures prior to entering the concrete.

## Specifications

The set-accelerating admixture shall be Daraset 400, non-chloride set accelerator, as manufactured by GCP Applied Technologies. The admixture shall be used in strict accordance with the manufacturers' recommendations. The admixture shall comply with ASTM Designation: C494 Type C and will not contain purposely added chlorides or contribute to steel corrosion. DARASET 400 is NSF Std. 61 certified when used at a maximum addition rate of 40 fl oz/100 lbs (390 mL/100 kg) of cementitious material. Certification of compliance will be made available upon request.

Concrete shall be proportioned in accordance with *Recommended Practice for Selecting Proportions for Normal Weight Concrete*, ACI 211.1 or *Recommended Practice for Selecting Proportions for Structural Lightweight Concrete*, ACI 211.2, or in accordance with ACI 318.

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GCP0083

DS-31-1116



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## SECTION 1: IDENTIFICATION

### 1.1. Product Identifier

**Product Form:** Mixture

**Product Name:** Ready Mix Concrete

### 1.2. Intended Use of the Product

Ready Mix Concrete is used in the construction of various structures and objects.

### 1.3. Name, Address, and Telephone of the Responsible Party

#### Company

BURNCO Rock Products Ltd.

Box 1480, Station T

CALGARY, ALBERTA, CANADA T2H 2P9

403-255-2600

[www.burnco.com](http://www.burnco.com)

### 1.4. Emergency Telephone Number

**Emergency Number :** 403-255-2600 BURNCO

## SECTION 2: HAZARDS IDENTIFICATION

### 2.1. Classification of the Substance or Mixture

#### GHS-US/CA Classification

HHNOC 1

Skin Corr. 1C                      H314

Eye Dam. 1                        H318

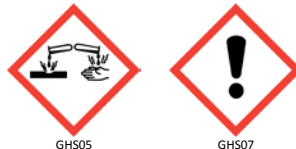
Skin Sens. 1                       H317

Full text of hazard classes and H-statements : see section 16

### 2.2. Label Elements

#### GHS-US/CA Labeling

#### Hazard Pictograms (GHS-US/CA) :



#### Signal Word (GHS-US/CA) :

Danger

#### Hazard Statements (GHS-US/CA) :

H314 - Causes severe skin burns and eye damage.  
H317 - May cause an allergic skin reaction.  
H318 - Causes serious eye damage.  
Causes severe damage to the respiratory tract.

#### Precautionary Statements (GHS-US/CA) :

P260 - Do not breathe dust, mist, spray.  
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.  
P272 - Contaminated work clothing should not be allowed out of the workplace.  
P280 - Wear protective gloves, protective clothing, and eye protection.  
P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.  
P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.  
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.  
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P310 - Immediately call a POISON CENTER or doctor.  
P321 - Specific treatment (see section 4 on this SDS).  
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.

# Ready Mix Concrete

## Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations And According To The Hazardous Products Regulation (February 11, 2015).

P362+P364 - Take off contaminated clothing and wash it before reuse.  
P405 - Store locked up.  
P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

### 2.3. Other Hazards

Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions. Wet cement on unprotected skin, whether direct or through saturated clothing, can cause severe, third degree caustic burns.

### 2.4. Unknown Acute Toxicity (GHS-US/CA)

No data available

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substance

Not applicable

### 3.2. Mixture

Name	Product Identifier	% *	GHS Ingredient Classification
Quartz**	(CAS-No.) 14808-60-7	0.1 - 100	Carc. 1A, H350 STOT SE 3, H335 STOT RE 1, H372
Gravel	(CAS-No.) Not applicable	45	Not classified
Natural Sand	(CAS-No.) Not applicable	34	Not classified
Cement, portland, chemicals	(CAS-No.) 65997-15-1	13	HHNOC 1 Skin Irrit. 2, H315 Eye Dam. 1, H318 Skin Sens. 1, H317 STOT SE 3, H335
Water	(CAS-No.) 7732-18-5	6	Not classified
Ashes, residues	(CAS-No.) 68131-74-8	2	Eye Irrit. 2B, H320

Full text of H-phrases: see section 16

\*Percentages are listed in weight by weight percentage (w/w%) for liquid and solid ingredients. Gas ingredients are listed in volume by volume percentage (v/v%).

\*\*Finely divided Quartz dust has caused cancer and lung disease in workers that inhale it over an extended period of time. Quartz dust is not respirable while this product is in liquid form, thus the hazards usually associated with Quartz dust are not applicable to this product.

## SECTION 4: FIRST AID MEASURES

### 4.1. Description of First-aid Measures

**General:** Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

**Inhalation:** Remove to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.

**Skin Contact:** Remove contaminated clothing. Immediately flush skin with plenty of water for at least 60 minutes. Immediately call a POISON CENTER or doctor. Wash contaminated clothing before reuse.

**Eye Contact:** Rinse cautiously with water for at least 60 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

**Ingestion:** Rinse mouth. Do NOT induce vomiting. Obtain emergency medical attention.

### 4.2. Most Important Symptoms and Effects Both Acute and Delayed

**General:** Causes severe skin burns and eye damage. Causes serious eye damage. Skin sensitization.

**Inhalation:** Causes severe damage to the respiratory tract.

**Skin Contact:** Corrosive. Causes burns. Redness, pain, swelling, itching, burning, dryness, and dermatitis. May cause an allergic skin reaction. When this product is wet it is corrosive.

**Eye Contact:** Causes serious eye damage. Redness, pain, swelling, itching, burning, tearing, and blurred vision. Causes permanent damage to the cornea, iris, or conjunctiva.

**Ingestion:** May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

# Ready Mix Concrete

## Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations And According To The Hazardous Products Regulation (February 11, 2015).

**Chronic Symptoms:** If dust is generated, repeated exposure through inhalation may cause cancer or lung disease. Pre-existing lung diseases such as emphysema or asthma may be aggravated by exposure to dusts. Pulmonary function may be reduced by inhalation of respirable crystalline silica. Also lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung which may aggravate other pulmonary conditions and diseases and which increases susceptibility to pulmonary tuberculosis. Progressive massive fibrosis may be accompanied by right heart enlargement, heart failure, and pulmonary failure. Smoking aggravates the effects of exposure. Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. Silicosis increases the risk of tuberculosis. Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

### 4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

## SECTION 5: FIRE-FIGHTING MEASURES

### 5.1. Extinguishing Media

**Suitable Extinguishing Media:** Water spray, dry chemical, foam, carbon dioxide.

**Unsuitable Extinguishing Media:** Do not use a heavy water stream. Use of heavy stream of water may spread fire.

### 5.2. Special Hazards Arising From the Substance or Mixture

**Fire Hazard:** Not flammable.

**Explosion Hazard:** Product is not explosive.

**Reactivity:** Reacts slowly with water forming hydrated compounds, releasing heat and producing a strong alkaline solution until reaction is substantially complete. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction.

### 5.3. Advice for Firefighters

**Precautionary Measures Fire:** Exercise caution when fighting any chemical fire. Under fire conditions, hazardous fumes will be present.

**Firefighting Instructions:** Do not allow run-off from fire fighting to enter drains or water sources. Do not breathe fumes or vapors from fire. Use water spray or fog for cooling exposed containers.

**Protection During Firefighting:** Do not enter fire area without proper protective equipment, including respiratory protection.

**Hazardous Combustion Products:** Carbon oxides (CO, CO<sub>2</sub>). Silicon oxides.

### Reference to Other Sections

Refer to Section 9 for flammability properties.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. Personal Precautions, Protective Equipment and Emergency Procedures

**General Measures:** Avoid breathing dust, mist, spray. Do not get in eyes, on skin, or on clothing.

#### 6.1.1. For Non-Emergency Personnel

**Protective Equipment:** Use appropriate personal protective equipment (PPE).

**Emergency Procedures:** Evacuate unnecessary personnel.

#### 6.1.2. For Emergency Personnel

**Protective Equipment:** Equip cleanup crew with proper protection.

**Emergency Procedures:** Ventilate area. Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit.

### 6.2. Environmental Precautions

Prevent entry to sewers and public waters.

### 6.3. Methods and Materials for Containment and Cleaning Up

**For Containment:** Place spilled material into a container. Avoid contact with skin. Wear appropriate protective equipment as described in Section 8. Scrape wet concrete and place in container. Allow material to dry or solidify before disposal. Do not wash concrete down sewage and drainage systems or into bodies of water (e.g. streams). Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. As an immediate precautionary measure, isolate spill or leak area in all directions.

# Ready Mix Concrete

## Safety Data Sheet

According To Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations And According To The Hazardous Products Regulation (February 11, 2015).

**Methods for Cleaning Up:** Cautiously neutralize spilled liquid. Clean up spills immediately and dispose of waste safely. Avoid actions that cause dust to become airborne during clean-up such as dry sweeping or using compressed air. Use HEPA vacuum or thoroughly wet with water to clean-up dust. Use PPE described in Section 8. Transfer spilled material to a suitable container for disposal. Contact competent authorities after a spill.

### 6.4. Reference to Other Sections

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

## SECTION 7: HANDLING AND STORAGE

### 7.1. Precautions for Safe Handling

**Additional Hazards When Processed:** Wet cement is corrosive. Take appropriate precautions to prevent unnecessary contact.

Cutting, crushing or grinding hardened cement, concrete or other crystalline silica-bearing materials will release respirable crystalline silica. Use all appropriate measures of dust control or suppression, and Personal Protective Equipment (PPE) described in Section 8 below. Do not handle until all safety precautions have been read and understood. May release corrosive vapors.

**Precautions for Safe Handling:** Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle empty containers with care because they may still present a hazard. Do not get in eyes, on skin, or on clothing. Do not breathe dust, mist, and spray.

**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety procedures.

### 7.2. Conditions for Safe Storage, Including Any Incompatibilities

**Technical Measures:** Comply with applicable regulations.

**Storage Conditions:** Keep/Store away from direct sunlight, extremely high or low temperatures and incompatible materials. Keep container closed when not in use. Store in a dry, cool place. Store in original container or corrosive resistant and/or lined container.

**Incompatible Materials:** Wet cement is alkaline and is incompatible with acids, ammonium salts and aluminum metal. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.

### 7.3. Specific End Use(s)

Ready Mix Concrete is used in the construction of various structures and objects.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control Parameters

For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), AIHA (WEEL), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government.

Cement, portland, chemicals (65997-15-1)		
Mexico	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup>
Mexico	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup>
USA ACGIH	ACGIH TWA (mg/m <sup>3</sup> )	1 mg/m <sup>3</sup> (particulate matter containing no asbestos and <1% crystalline silica, respirable particulate matter)
USA ACGIH	ACGIH chemical category	Not Classifiable as a Human Carcinogen
USA OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	15 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable fraction)
USA NIOSH	NIOSH REL (TWA) (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (total dust) 5 mg/m <sup>3</sup> (respirable dust)
USA IDLH	US IDLH (mg/m <sup>3</sup> )	5000 mg/m <sup>3</sup>
Alberta	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup>
British Columbia	OEL TWA (mg/m <sup>3</sup> )	1 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1% Crystalline silica-respirable particulate)
Manitoba	OEL TWA (mg/m <sup>3</sup> )	1 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1% Crystalline silica-respirable particulate matter)
New Brunswick	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1% Crystalline silica)
Newfoundland & Labrador	OEL TWA (mg/m <sup>3</sup> )	1 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1% Crystalline silica-respirable particulate matter)
Nova Scotia	OEL TWA (mg/m <sup>3</sup> )	1 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1%

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		Crystalline silica-respirable particulate matter)
<b>Nunavut</b>	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup>
<b>Nunavut</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup>
<b>Northwest Territories</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup>
<b>Ontario</b>	OEL TWA (mg/m <sup>3</sup> )	1 mg/m <sup>3</sup> (containing no Asbestos and <1% Crystalline silica-respirable)
<b>Prince Edward Island</b>	OEL TWA (mg/m <sup>3</sup> )	1 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1% Crystalline silica-respirable particulate matter)
<b>Québec</b>	VEMP (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (containing no Asbestos and <1% Crystalline silica-total dust) 5 mg/m <sup>3</sup> (containing no Asbestos and <1% Crystalline silica-respirable dust)
<b>Saskatchewan</b>	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup>
<b>Saskatchewan</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup>
<b>Yukon</b>	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup>
<b>Yukon</b>	OEL TWA (mg/m <sup>3</sup> )	30 mppcf 10 mg/m <sup>3</sup>
<b>Quartz (14808-60-7)</b>		
<b>Mexico</b>	OEL TWA (mg/m <sup>3</sup> )	0.1 mg/m <sup>3</sup> (respirable fraction)
<b>USA ACGIH</b>	ACGIH TWA (mg/m <sup>3</sup> )	0.025 mg/m <sup>3</sup> (respirable particulate matter)
<b>USA ACGIH</b>	ACGIH chemical category	A2 - Suspected Human Carcinogen
<b>USA OSHA</b>	OSHA PEL (TWA) (mg/m <sup>3</sup> )	50 µg/m <sup>3</sup>
<b>USA NIOSH</b>	NIOSH REL (TWA) (mg/m <sup>3</sup> )	0.05 mg/m <sup>3</sup> (respirable dust)
<b>USA IDLH</b>	US IDLH (mg/m <sup>3</sup> )	50 mg/m <sup>3</sup> (respirable dust)
<b>Alberta</b>	OEL TWA (mg/m <sup>3</sup> )	0.025 mg/m <sup>3</sup> (respirable particulate)
<b>British Columbia</b>	OEL TWA (mg/m <sup>3</sup> )	0.025 mg/m <sup>3</sup> (respirable)
<b>Manitoba</b>	OEL TWA (mg/m <sup>3</sup> )	0.025 mg/m <sup>3</sup> (respirable particulate matter)
<b>New Brunswick</b>	OEL TWA (mg/m <sup>3</sup> )	0.1 mg/m <sup>3</sup> (respirable fraction)
<b>Newfoundland &amp; Labrador</b>	OEL TWA (mg/m <sup>3</sup> )	0.025 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nova Scotia</b>	OEL TWA (mg/m <sup>3</sup> )	0.025 mg/m <sup>3</sup> (respirable particulate matter)
<b>Nunavut</b>	OEL TWA (mg/m <sup>3</sup> )	0.05 mg/m <sup>3</sup> (respirable fraction)
<b>Northwest Territories</b>	OEL TWA (mg/m <sup>3</sup> )	0.05 mg/m <sup>3</sup> (respirable fraction)
<b>Ontario</b>	OEL TWA (mg/m <sup>3</sup> )	0.1 mg/m <sup>3</sup> (designated substances regulation-respirable)
<b>Prince Edward Island</b>	OEL TWA (mg/m <sup>3</sup> )	0.025 mg/m <sup>3</sup> (respirable particulate matter)
<b>Québec</b>	VEMP (mg/m <sup>3</sup> )	0.1 mg/m <sup>3</sup> (respirable dust)
<b>Saskatchewan</b>	OEL TWA (mg/m <sup>3</sup> )	0.05 mg/m <sup>3</sup> (respirable fraction)
<b>Yukon</b>	OEL TWA (mg/m <sup>3</sup> )	300 particle/mL
<b>Particulates not otherwise classified (PNOC)</b>		
<b>USA ACGIH</b>	ACGIH TWA (mg/m <sup>3</sup> )	3 mg/m <sup>3</sup> Respirable fraction 10 mg/m <sup>3</sup> Total Dust
<b>USA OSHA</b>	OSHA PEL (TWA) (mg/m <sup>3</sup> )	5 mg/m <sup>3</sup> Respirable fraction 15 mg/m <sup>3</sup> Total Dust
<b>Alberta</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (total) 3 mg/m <sup>3</sup> (respirable)
<b>British Columbia</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (nuisance dust-total dust) 3 mg/m <sup>3</sup> (nuisance dust-respirable fraction)
<b>Manitoba</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (inhalable particles, recommended) 3 mg/m <sup>3</sup> (respirable particles, recommended)
<b>New Brunswick</b>	OEL TWA (mg/m <sup>3</sup> )	3 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1% Crystalline silica, respirable fraction) 10 mg/m <sup>3</sup> (particulate matter containing no Asbestos and <1% Crystalline silica, inhalable fraction)
<b>Newfoundland &amp; Labrador</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (inhalable particles, recommended)

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		3 mg/m <sup>3</sup> (respirable particles, recommended)
<b>Nova Scotia</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (inhalable particles, recommended) 3 mg/m <sup>3</sup> (respirable particles, recommended)
<b>Nunavut</b>	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup> (insoluble or poorly soluble-inhalable fraction) 6 mg/m <sup>3</sup> (insoluble or poorly soluble-respirable fraction)
<b>Nunavut</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (insoluble or poorly soluble-inhalable fraction) 3 mg/m <sup>3</sup> (insoluble or poorly soluble-respirable fraction)
<b>Northwest Territories</b>	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup> (insoluble or poorly soluble-inhalable fraction) 6 mg/m <sup>3</sup> (insoluble or poorly soluble-respirable fraction)
<b>Northwest Territories</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (insoluble or poorly soluble-inhalable fraction) 3 mg/m <sup>3</sup> (insoluble or poorly soluble-respirable fraction)
<b>Ontario</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (inhalable) 3 mg/m <sup>3</sup> (respirable)
<b>Prince Edward Island</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (inhalable particles, recommended) 3 mg/m <sup>3</sup> (respirable particles, recommended)
<b>Québec</b>	VEMP (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (including dust, inert or nuisance particulates-total dust)
<b>Saskatchewan</b>	OEL STEL (mg/m <sup>3</sup> )	20 mg/m <sup>3</sup> (insoluble or poorly soluble-inhalable fraction) 6 mg/m <sup>3</sup> (insoluble or poorly soluble-respirable fraction)
<b>Saskatchewan</b>	OEL TWA (mg/m <sup>3</sup> )	10 mg/m <sup>3</sup> (insoluble or poorly soluble-inhalable fraction) 3 mg/m <sup>3</sup> (insoluble or poorly soluble-respirable fraction)

## 8.2. Exposure Controls

**Appropriate Engineering Controls:** Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed.

**Personal Protective Equipment:** Gloves. Protective clothing. Protective goggles. Insufficient ventilation: wear respiratory protection.



**Materials for Protective Clothing:** Chemically resistant materials and fabrics. Corrosion-proof clothing.

**Hand Protection:** Wear protective gloves.

**Eye Protection:** Chemical safety goggles and face shield.

**Skin and Body Protection:** Wear suitable protective clothing.

**Respiratory Protection:** If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn. In case of inadequate ventilation, oxygen deficient atmosphere, or where exposure levels are not known wear approved respiratory protection.

**Other Information:** When using, do not eat, drink or smoke.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on Basic Physical and Chemical Properties

<b>Physical State</b>	: Liquid
<b>Appearance</b>	: Grey
<b>Odor</b>	: Not available
<b>Odor Threshold</b>	: Not available
<b>pH</b>	: 12 - 13 in water
<b>Evaporation Rate</b>	: Not available
<b>Melting Point</b>	: Not available
<b>Freezing Point</b>	: Not available
<b>Boiling Point</b>	: Not available
<b>Flash Point</b>	: Does not burn
<b>Auto-ignition Temperature</b>	: Not available
<b>Decomposition Temperature</b>	: Not available

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<b>Flammability (solid, gas)</b>	: Not available
<b>Lower Flammable Limit</b>	: Not available
<b>Upper Flammable Limit</b>	: Not available
<b>Vapor Pressure</b>	: Not available
<b>Relative Vapor Density at 20°C</b>	: Not available
<b>Relative Density</b>	: Not available
<b>Specific Gravity</b>	: Not available
<b>Solubility</b>	: Not available
<b>Partition Coefficient: N-Octanol/Water</b>	: Not available
<b>Viscosity</b>	: Not available

### SECTION 10: STABILITY AND REACTIVITY

- 10.1. Reactivity:** Reacts slowly with water forming hydrated compounds, releasing heat and producing a strong alkaline solution until reaction is substantially complete. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction.
- 10.2. Chemical Stability:** Stable under recommended handling and storage conditions (see section 7).
- 10.3. Possibility of Hazardous Reactions:** Hazardous polymerization will not occur.
- 10.4. Conditions to Avoid:** Direct sunlight, extremely high or low temperatures, and incompatible materials.
- 10.5. Incompatible Materials:** Wet cement and cement clinker is alkaline and is incompatible with acids, ammonium salts and aluminum metal. Cement dissolves in hydrofluoric acid, producing corrosive silicon tetrafluoride gas. Cement reacts with water to form silicates and calcium hydroxide. Silicates react with powerful oxidizers such as fluorine, boron trifluoride, chlorine trifluoride, manganese trifluoride, and oxygen difluoride.
- 10.6. Hazardous Decomposition Products:** Thermal decomposition generates: Carbon oxides (CO, CO<sub>2</sub>). Silicon oxides. Corrosive vapors.

### SECTION 11: TOXICOLOGICAL INFORMATION

#### 11.1. Information on Toxicological Effects - Product

**Acute Toxicity (Oral):** Not classified

**Acute Toxicity (Dermal):** Not classified

**Acute Toxicity (Inhalation):** Not classified

**LD50 and LC50 Data:** Not available

**Skin Corrosion/Irritation:** Causes severe skin burns and eye damage.

**pH:** 12 - 13 in water

**Eye Damage/Irritation:** Causes serious eye damage.

**pH:** 12 - 13 in water

**Respiratory or Skin Sensitization:** May cause an allergic skin reaction.

**Germ Cell Mutagenicity:** Not classified

**Carcinogenicity:** Not classified.

**Specific Target Organ Toxicity (Repeated Exposure):** Not classified.

**Reproductive Toxicity:** Not classified

**Specific Target Organ Toxicity (Single Exposure):** Not classified.

**Aspiration Hazard:** Not classified

**Symptoms/Injuries After Inhalation:** May be corrosive to the respiratory tract.

**Symptoms/Injuries After Skin Contact:** Corrosive. Causes burns. Redness, pain, swelling, itching, burning, dryness, and dermatitis. May cause an allergic skin reaction. When this product is wet it is corrosive.

**Symptoms/Injuries After Eye Contact:** Causes serious eye damage. Redness, pain, swelling, itching, burning, tearing, and blurred vision. Causes permanent damage to the cornea, iris, or conjunctiva.

**Symptoms/Injuries After Ingestion:** May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

**Chronic Symptoms:** If dust is generated, repeated exposure through inhalation may cause cancer or lung disease. Pre-existing lung diseases such as emphysema or asthma may be aggravated by exposure to dusts. Pulmonary function may be reduced by inhalation of respirable crystalline silica. Also lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung which may aggravate other pulmonary conditions and diseases and which increases susceptibility to pulmonary tuberculosis. Progressive massive fibrosis may be accompanied by right heart enlargement, heart failure, and pulmonary failure. Smoking

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aggravates the effects of exposure. Some studies show that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders such as scleroderma (thickening of the skin), systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. Silicosis increases the risk of tuberculosis. Some studies show an increased incidence of chronic kidney disease and end-stage renal disease in workers exposed to respirable crystalline silica.

### 11.2. Information on Toxicological Effects - Ingredient(s)

#### LD50 and LC50 Data:

<b>Quartz (14808-60-7)</b>	
LD50 Oral Rat	> 5000 mg/kg
LD50 Dermal Rat	> 5000 mg/kg
<b>Ashes, residues (68131-74-8)</b>	
LD50 Oral Rat	> 2000 mg/kg
<b>Quartz (14808-60-7)</b>	
IARC Group	1
National Toxicology Program (NTP) Status	Known Human Carcinogens.
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.

## SECTION 12: ECOLOGICAL INFORMATION

### 12.1. Toxicity

Ecology - General: Not classified.

### 12.2. Persistence and Degradability

<b>Ready Mix Concrete</b>	
Persistence and Degradability	Not established.

### 12.3. Bioaccumulative Potential

<b>Ready Mix Concrete</b>	
Bioaccumulative Potential	Not established.

12.4. Mobility in Soil Not available

### 12.5. Other Adverse Effects

Other Information: Avoid release to the environment.

## SECTION 13: DISPOSAL CONSIDERATIONS

### 13.1. Waste treatment methods

**Sewage Disposal Recommendations:** Do not empty into drains. Do not dispose of waste into sewer.

**Waste Disposal Recommendations:** Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

**Additional Information:** Container may remain hazardous when empty. Continue to observe all precautions.

**Ecology - Waste Materials:** Avoid release to the environment.

## SECTION 14: TRANSPORT INFORMATION

The shipping description(s) stated herein were prepared in accordance with certain assumptions at the time the SDS was authored, and can vary based on a number of variables that may or may not have been known at the time the SDS was issued.

14.1. In Accordance with DOT Not regulated for transport

14.2. In Accordance with IMDG Not regulated for transport

14.3. In Accordance with IATA Not regulated for transport

14.4. In Accordance with TDG Not regulated for transport

## SECTION 15: REGULATORY INFORMATION

### 15.1. US Federal Regulations

<b>Ready Mix Concrete</b>	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard
<b>Cement, portland, chemicals (65997-15-1)</b>	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
<b>Quartz (14808-60-7)</b>	

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Listed on the United States TSCA (Toxic Substances Control Act) inventory

### Ashes, residues (68131-74-8)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

### Water (7732-18-5)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

## 15.2. US State Regulations

### Cement, portland, chemicals (65997-15-1)

U.S. - Massachusetts - Right To Know List

U.S. - New Jersey - Right to Know Hazardous Substance List

U.S. - Pennsylvania - RTK (Right to Know) List

### Quartz (14808-60-7)

U.S. - Massachusetts - Right To Know List

U.S. - New Jersey - Right to Know Hazardous Substance List

U.S. - Pennsylvania - RTK (Right to Know) List

## 15.3. Canadian Regulations

### Cement, portland, chemicals (65997-15-1)

Listed on the Canadian DSL (Domestic Substances List)

### Quartz (14808-60-7)

Listed on the Canadian DSL (Domestic Substances List)

### Ashes, residues (68131-74-8)

Listed on the Canadian DSL (Domestic Substances List)

### Water (7732-18-5)

Listed on the Canadian DSL (Domestic Substances List)

## SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Date of Preparation or Latest Revision : 04/13/2017

### Revision

**Other Information** : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 and Canada's Hazardous Products Regulations (HPR).

### GHS Full Text Phrases:

Carc. 1A	Carcinogenicity Category 1A
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Eye Irrit. 2B	Serious eye damage/eye irritation Category 2B
HHNOC 1	Health hazard not otherwise classified, category 1
Skin Corr. 1C	Skin corrosion/irritation Category 1C
Skin Irrit. 2	Skin corrosion/irritation Category 2
Skin Sens. 1	Skin sensitization, Category 1
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H314	Causes severe skin burns and eye damage
H315	Causes skin irritation
H317	May cause an allergic skin reaction
H318	Causes serious eye damage
H320	Causes eye irritation
H335	May cause respiratory irritation
H350	May cause cancer
H372	Causes damage to organs through prolonged or repeated exposure

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*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*

NA GHS SDS 2015 (Can, US, Mex)