



4 Inverness Court East  
Suite 250  
Englewood, CO 80112  
Office: (303) 770-7878  
Fax: (303) 770-7667

# LETTER OF TRANSMITTAL

TO: Steamboat Structures  
Denver Metro, CO

DATE: 8/16/2021

FILE NO. 008-01

ATTN: Heather Reed

RE: Forest Lakes Bridges

## WE ARE SENDING YOU:

- |   |   |                                  |
|---|---|----------------------------------|
| <input type="checkbox"/> Shop Drawings  | <input type="checkbox"/> Copy of Letter                   | <input type="checkbox"/> Samples |
| <input type="checkbox"/> Specifications | <input type="checkbox"/> Reports                          | <input type="checkbox"/> _____   |
| <input type="checkbox"/> Plans          | <input checked="" type="checkbox"/> Submittal Information |                                  |

SUBMITTED BY: Structures

COPIES	DESCRIPTION	CONTRACTOR
1	Concrete Mix Design Class D	Structures

## THESE ARE TRANSMITTED:

- |  |  |   |
|--|--|---|
| <input checked="" type="checkbox"/> For Approval | <input checked="" type="checkbox"/> For Review and Comment | <input type="checkbox"/> Returned for Corrections |
| <input type="checkbox"/> For Your Use            | <input type="checkbox"/> Approved As Submitted             | <input type="checkbox"/> _____                    |
| <input type="checkbox"/> As Requested            | <input type="checkbox"/> Approved As Noted                 |   |

## REMARKS:

---

---

---

---

---

---

cc: File

**SHOP DRAWING REVIEW**

☒ **NO EXCEPTIONS**      ☐ **REVISE AS NOTED**

☐ **REVISE AND RESUBMIT**    ☐ **REJECTED**

This review is for general conformance with the design intent of the project and general compliance with the information provided in the contract documents. Review, corrections, or comments made concerning the shop drawings during this review do not relieve the contractor from compliance with the requirements of the drawings and specifications, nor relieve the contractor of contractual responsibility for any error or deviation from the contract documents.

The contractor is responsible for, but not limited to: confirming all quantities, dimensions, and structural capabilities, selecting fabrication and construction techniques, coordinating work with that of all other trades, and performing work in a safe and satisfactory manner.

**STEAMBOAT STRUCTURES, LLC**

By: **H. Reed**      DATE: **8/17/21**

# CDOT Mix Design Summary

CDOT Mix Design Number: 2020138 Expiration Date: 10/15/2021

Supplier: Martin Marietta Item No 601 Class B/D/P Sulfate Class 2  
Supplier Mix ID: XCD4195 Design Strength 4500

## Mix Design Proportioning

Cement	528 lb/CY	Supplier:	GCC (Pueblo)	Type	I/II
Fly Ash	132 lb/CY	Supplier:	CR Minerals (Pueblo)	Type	F
Pozzola	lb/CY	Supplier:		Type	
Aggregate 1	1620 lb/CY	Source:	MMM - Parkdale Pit	Gradation:	#57/67
		Sampled On	9/1/2019	SG	2.73
Aggregate 2	lb/CY	Source:		Gradation:	
		Sampled On		SG	
Aggregate 3	lb/CY	Source:		Gradation:	
		Sampled On		SG	
Aggregate 4	lb/CY	Source:		Gradation:	
		Sampled On		SG	
Fines	1275 lb/CY	Source:	MMM - Penrose Pit	Gradation:	
		Sampled On	9/1/2019	SG	2.63
Fiber	lb/CY	Manufacturer:		Product	
Air Entrained	4 oz/CY	Manufacturer:	Chryso	Product:	Air 260
Admixture 1	52.8 oz/CY	Manufacturer:	Chryso	Product	Quad 855 EMx
Admixture 2	oz/CY	Manufacturer:		Product:	
Admixture 3	oz/CY	Manufacturer:		Product:	
Admixture 4	oz/CY	Manufacturer:		Product:	
Pigment	lb/CY	Manufacturer:		Product:	
Water	290 lb/CY				

Trial Batch Test Results: Trial Batch Date 11/27/2019

Unit Weight	142.2 pcf	Shrinkage	0.048 %	7 Day Compressive Strength	5930psi
Yeild	1.00	T358 Resistivity	22.0 Kohm	14 Day Compressive Strength	psi
w/cm	0.44	C1202 Permeability	Coulomb	28 Day Compressive Strength	7510psi
Air	6 %	SAM No.	0.38	7 Day Flexural Strength	705 psi
Slump	4.25 in	C1611 Flow	in	28 Day Flexural Strength	870 psi

## Remarks:

Trial 90535  
New aggs: #57/67 (9/1/20) SG=2.67 Abs=0.6  
Fines (9/1/20) SG=2.62 Abs=1.2

Approved By Val Niculae

Approved On 6/5/2020

**GCC of America**

600 S. Cherry Street, Suite 1000, Glendale, CO 80246  
Sales (303) 739-5900, Customer Service (800) 225-5422

**MATERIAL CERTIFICATION REPORT**

**Plant:** Pueblo  
**Address:** 3372 Lime Road  
Pueblo, CO 81004  
**Contact:** Urs Fuchs  
**Phone:** (719) 647-6821

**Cement Type:** I/II, GU  
**Date Issued:** 14-Jul-21  
**Production Period:** 1-Jun-21  
**To:** 30-Jun-21

**STANDARD REQUIREMENTS ASTM C150/AASHTO M85/ASTM C1157**

CHEMICAL			
Item	ASTM Test Method	ASTM C150 Spec. Limit	Test Result
SiO <sub>2</sub> (%)	C114	-	20.1
Al <sub>2</sub> O <sub>3</sub> (%)	C114	6.0 max	4.4
Fe <sub>2</sub> O <sub>3</sub> (%)	C114	6.0 max	3.8
CaO (%)	C114	-	63.5
MgO (%)	C114	6.0 max	0.9
SO <sub>3</sub> (%)	C114	3.0 max <sup>A</sup>	3.4
Loss On Ignition (%) <sup>B</sup>	C114	3.5 max <sup>C</sup>	2.9
Na <sub>2</sub> O (%)	C114	-	0.16
K <sub>2</sub> O (%)	C114	-	0.59
Insoluble Residue (%)	C114	1.5 max	0.9
CO <sub>2</sub> (%) <sup>B</sup>	C114	-	1.6
Limestone (%)	C150	5.0 max	4.1
CaCO <sub>3</sub> in Limestone (%)	C150	70 min	87
Inorganic Processing Addition	C150	5.0 max	-
Potential Phase Composition			
C <sub>3</sub> S (%)	C150	-	56
C <sub>2</sub> S (%)	C150	-	14
C <sub>3</sub> A (%)	C150	8 max	5
C <sub>4</sub> AF (%)	C150	-	11

PHYSICAL				
Item	ASTM Test Method	ASTM C150 Spec. Limit	ASTM C1157 Spec. Limit	Test Result
Air Content (% vol)	C185	12 max	12 max	8
Blaine Fineness (m <sup>2</sup> /kg)	C204	260 min	-	403
Residue 45 µm (No.325) Sieve (%)	C430	-	-	3.5
Autoclave Expansion (%)	C151	0.80 max	0.80 max	-0.01
Compressive Strength				
3 days, MPa (psi)	C109	12.0 (1740) min	13.0 (1890) min	28.9 (4200)
7 days, MPa (psi)	C109	19.0 (2760) min	20.0 (2900) min	34.6 (5020)
28 days, MPa (psi) <sup>D</sup>	C109	-	28.0 (4060) min	43.1 (6250)
Time of Setting, Initial Vicat (min)	C191	45 min / 375 max	45 min / 420 max	118
Mortar Bar Expansion (%)	C1038	0.020 max	0.020 max	0.007

ADDITIONAL DATA					
Type	Limestone	Test Method	Base Phase Composition	ASTM Test Method	Test Result
SiO <sub>2</sub> (%)	7.0	Internal	C <sub>3</sub> S (%)	C150	59
Al <sub>2</sub> O <sub>3</sub> (%)	1.8	Internal	C <sub>2</sub> S (%)	C150	15
Fe <sub>2</sub> O <sub>3</sub> (%)	1.1	Internal	C <sub>3</sub> A (%)	C150	5
CaO (%)	47.6	Internal	C <sub>4</sub> AF (%)	C150	12
SO <sub>3</sub> (%)	0.3	Internal			

**OPTIONAL REQUIREMENTS ASTM C150/AASHTO M85/ASTM C1157**

CHEMICAL			
Item	ASTM Test Method	ASTM C150 Spec. Limit	Test Result
Equivalent Alkalies (%)	C114	-	0.55

PHYSICAL				
Item	ASTM Test Method	ASTM C150 Spec. Limit	ASTM C1157 Spec. Limit	Test Result
False Set (%)	C451	50 min	50 min	73

<sup>A</sup> It is permissible to exceed the specification limit provided that ASTM C1038 Mortar Bar Expansion does not exceed 0.020 % at 14 days.

<sup>B</sup> This alternative analysis has been qualified in accordance with ASTM C114 and meets requirements of Table 1.

<sup>C</sup> Loss on ignition, max: 3.0 % when limestone is not an ingredient; Loss on ignition, max: 3.5 % when limestone is an ingredient

<sup>D</sup> Test result of prior month

GCC of America Cement is warranted to conform at the time of shipment with current ASTM C150/AASHTO M85/ASTM C1157. No other warranty is made or implied. Having no control over the use of its cements, GCC of America does not guarantee finished work.

## ASTM C618-19 - Chemical and Physical Analyses - Fly Ash/Pozzolans

CTL Ticket: 21059	Plant of Origin: CR Minerals (Comanche) RFA	Sample Date Range: 04/08/2021
CTL Project: CT16959	Sample ID: Tephra RFA - April #1	to:
Report Date: 05/20/2021	Supplier: CR Minerals, Pueblo	Date Received: 04/09/2021

### Chemical Composition (%)

(by Wyoming Analytical Laboratories, Inc.)

#### ASTM C618-19

##### Class N

##### Class F

##### Class C

Silicon Dioxide:	57.1			
Aluminum Oxide:	14.1			
Iron Oxide:	2.0			
Total Silica, Aluminum, Iron:	73.2	≥70.0%	≥50.0%	≥50.0%
Sulfur Trioxide:	4.3	≤4.0%	≤5.0%	≤5.0%
Calcium Oxide:	9.8	N/A	≤18.0%	>18.0%

Product Class: Class F

Conforms to Class: Yes

### Volatile Composition (Mass%)

Moisture Content:	1.2	≤3.0%	≤3.0%	≤3.0%
Loss on Ignition:	4.1	≤10.0%	≤6.0%	≤6.0%

### Physical Test Results

Fineness, Retained on #325 Sieve (%):	7.3	≤34%	≤34%	≤34%
Strength Activity Index (%) *		* No 7-day limit if 28-day meets		
Percent of Control @ 7 Days:	87	≥75%	≥75%	≥75%
Percent of Control @ 28 Days:	99	≥75%	≥75%	≥75%
Water Requirement, % of Control:	100	≤115%	≤105%	≤105%
Soundness, Autoclave Expansion (%):	-0.03	≤0.8%	≤0.8%	≤0.8%
Density (g/cm3) :	2.41	N/A	N/A	N/A

### Uniformity Established from 10 previous tests

Average Fineness:	6.3	Difference 1(%)	±5(%)	±5(%)	±5(%)
Average Density:	2.41	Difference 0%	±5%	±5%	±5%

### Supplementary Requirements

Available Alkalis, as Na <sub>2</sub> O	1.13%		
Sodium Oxide:	0.71%	Drying Shrinkage %: 0.02	Max 0.03%
Potassium Oxide:	0.64%		

Comments: AA tested by CTL in Skokie - Meets ASTM and AASHTO

CTL | Thompson Materials Engineers, Inc.

Orville R. Werner, P.E.

05/20/2021





West Division  
Southern Area Aggregate District  
1910 Rand Avenue  
Colorado Springs, CO 80905

Attention: Mr. David Chelgren

Re: Aggregate Physical Property Test Results  
#57/67 Rock  
Parkdale Quarry  
Cañon City, CO

October 27, 2020

Mr. Chelgren:

Enclosed are the results of the physical properties tests performed on the #57/67 Rock sampled from the Parkdale Quarry in September 2020. Testing was performed in accordance with the procedures and specifications contained herein. Below is a summary of the results. Detailed test information is contained in the attachments.

Procedure	Description	#57/67 Rock
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregate	Att. #1-1
ASTM C 117	Materials Finer than 75µm (No. 200) Sieve by Washing	Att. #1-1
ASTM C 29	Bulk Density (Unit Weight) and Voids by Rodding	103 / 38
ASTM C 127	Specific Gravity (SSD) and Absorption of Coarse Aggregate	2.67 / 0.6
ASTM C 131	Degradation of Coarse Aggregate in the LA Abrasion Machine	33
CDOT CP-1.4211	Degradation of Coarse Aggregate in the Micro Deval Apparatus	10.5
ASTM C 88	Soundness by Use of Magnesium Sulfate	1
ASTM C 142	Clay Lumps and Friable Particles	0.1
ASTM C 123	Lightweight Particles	0.0

The materials selected for testing do not constitute the constituents of any specific mix design or blend. The materials named above represent products sold from the aforementioned site. Please contact us if you have any questions regarding these results.

Respectfully submitted,  
Martin Marietta Materials, Inc.  
Central Laboratory

Erik Biggers  
Testing Lab Manager



Todd Genovese, P.E.  
Division QA/QC Manager



Sieve Analysis of Fine and Coarse Aggregate

ASTM C 136 & C 117

Sieve Size		Percent Passing (%)	Specification ASTM (No. 57/67)
1"	25.0 mm	100	100
3/4"	19.0 mm	92	90 to 100
1/2"	12.5 mm	45	25 to 60
3/8"	9.5 mm	25	20 to 55
No. 4	4.75 mm	4	0 to 10
No. 8	2.36 mm	1	0 to 5
No. 16	1.18 mm	1	
No. 30	600 µm	1	
No. 50	300 µm	1	
No. 100	150 µm	1	
No. 200	75 µm	0.7	1.5 max.*

\* Denotes limit for material that is essentially free of clay or shale.

Bulk Density (Unit Weight) and Voids by Rodding

ASTM C 29

Sample Weight (lbs)	Measure Volume (ft³)	Unit Weight (lbs/ft³)	Unit Weight (tons/cy)	Voids by Rodding (%)
34.55	0.3340	103.4	1.40	37.5
34.44	0.3340	103.1	1.39	37.7
34.62	0.3340	103.7	1.40	37.4
Average		103	1.40	38

Bulk Specific Gravity (DRY) = 2.653

Specific Gravity and Absorption of Coarse Aggregate

ASTM C 127

Oven Dried Mass in Air (grams)	SSD Mass in Air (grams)	Mass in Water (grams)	$G_{sb(SSD)}$	Absorption (%)
3299.1	3317.8	2074.4	2.67	0.6

Degradation of Coarse Aggregate in the LA Abrasion Machine

ASTM C 131

Grading	Sample Mass Before Test (grams)	Sample Mass After Test (grams)	Percent Loss (%)	Specification ASTM C 33
B	5003.3	3334.0	33	50% max.

Degradation of Coarse Aggregate in the Micro Deval Apparatus

CDOT CP-L 4211

Grading	Sample Mass Before Test (grams)	Sample Mass After Test (grams)	Percent Loss (%)	Specification CDOT
A (7.2)	1502.0	1344.2	10.5	18% max.



Soundness by Use of Magnesium Sulfate

ASTM C 88

Sieve Size	Original Sample Individual % Retained		Mass of Individual Test Fraction (grams)	Mass of Combined Test Fraction (grams)		Percent Passing Designated Sieve After Test	Weighted Percent Loss (%)
				Before	After		
1-1/2" to 1"	0	8	-	501.3	500.0	0.3	0.0
1" to 3/4"	8		501.3				
3/4" to 1/2"	47	67	671.3	1001.3	986.8	1.4	1.0
1/2" to 3/8"	20		330				
3/8" to No. 4	21	21	300.2	300.2	295.4	1.6	0.3
Minus No. 4	4	4	-	-	-		
Total	100	100%	coarse aggregate fraction				1
Specification - ASTM C 33							18% max.

Sieve Size	Splitting		Crumbling		Cracking		Flaking		Total No. of Pieces Before Test
	No.	%	No.	%	No.	%	No.	%	
1-1/2" to 3/4"	0	0	0	0	0	0	0	0	36

Clay Lumps and Friable Particles

ASTM C 142

Sieve Size	Original Sample Individual % Retained		Mass of Combined Test Fraction (grams)		Percent Passing Designated Sieve After Test	Weighted Percent Loss (%)
			Before	After		
1-1/2" to 1"	0	8	3003.4	2998.7	0.2	0.0
1" to 3/4"	8					
3/4" to 1/2"	47	67	2000.9	1997.5	0.2	0.1
1/2" to 3/8"	20					
3/8" to No. 4	21	21	1000.3	998.2	0.2	0.0
Total	96%					0.1
Specification - ASTM C 33 (Class 5S)						2.0% max.

Lightweight Particles

ASTM C 123

Sieve Size	Specific Gravity of Heavy Liquid	Mass of Test Sample (grams)	Mass of Floating Particles (grams)	Percent of Lightweight Pieces (%)	Specification ASTM C 33
Plus No. 4	2.0	3001.2	0.0	0.0	0.5% max.



West Division  
Southern Area Aggregate District  
1910 Rand Avenue  
Colorado Springs, CO 80905

Attention: Mr. David Chelgren

Re: Aggregate Physical Property Test Results  
Washed Concrete Sand  
Penrose Pit  
Florence, CO

October 26, 2020

Mr. Chelgren:

Enclosed are the results of the physical properties tests performed on the materials sampled from the Penrose Pit in September 2020. Testing was performed in accordance with the procedures and specifications contained herein. Below is a summary of the results. Detailed test information is contained in the attachments.

Procedure	Description	Washed Concrete Sand
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregate	Att. #1-1
ASTM C 117	Materials Finer than 75 $\mu$ m (No. 200) Sieve by Washing	Att. #1-1
ASTM C 29	Bulk Density (Unit Weight) and Voids by Rodding	103 / 37
ASTM C 128	Specific Gravity (SSD) and Absorption of Fine Aggregate	2.62 / 1.2
ASTM D 7428	Degradation of Fine Aggregate in the Micro Deval Apparatus	9.6
ASTM C 88	Soundness by Use of Magnesium Sulfate	8
ASTM C 142	Clay Lumps and Friable Particles	0.3
ASTM C 123	Lightweight Particles	0.0
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate	80
ASTM C 40	Organic Impurities in Fine Aggregate	Plate 1

The materials selected for testing do not constitute the constituents of any specific mix design or blend. The materials named above represent products sold from the aforementioned site. Please contact us if you have any questions regarding these results.

Respectfully submitted,  
Martin Marietta Materials, Inc.  
Central Laboratory

Erik Biggers  
Testing Lab Manager



Todd Genovese, P.E.  
Division QA/QC Manager





## Penrose Pit

## Washed Concrete Sand

## Sieve Analysis of Fine and Coarse Aggregate

ASTM C 136 &amp; C 117

Sieve Size		Percent Passing (%)	Specification ASTM C 33
3/8"	9.5 mm	100	100
No. 4	4.75 mm	99	95 to 100
No. 8	2.36 mm	86	80 to 100
No. 16	1.18 mm	65	50 to 85
No. 30	600 $\mu$ m	45	25 to 60
No. 50	300 $\mu$ m	19	5 to 30
No. 100	150 $\mu$ m	5	0 to 10
No. 200	75 $\mu$ m	1.5	0 to 3.0
Fineness Modulus		2.81	2.3 to 3.1

## Bulk Density (Unit Weight) and Voids by Rodding

ASTM C 29

Sample Weight (lbs)	Measure Volume (ft <sup>3</sup> )	Unit Weight (lbs/ft <sup>3</sup> )	Unit Weight (tons/cy)	Voids by Rodding (%)
10.26	0.1000	102.6	1.39	36.5
10.26	0.1000	102.6	1.39	36.5
10.25	0.1000	102.5	1.38	36.6
Average		103	1.38	37

Bulk Specific Gravity (DRY) = 2.591

## Specific Gravity and Absorption of Fine Aggregate

ASTM C 128

Oven Dried Mass in Air (grams)	Mass of Pycnometer Filled with Water (grams)	SSD Mass in Air (grams)	Mass of Pycnometer w/ Sample and Water (grams)	$G_{sb}$ (SSD)	Absorption (%)
494.1	1242.2	500.0	1551.5	2.62	1.2

## Degradation of Fine Aggregate in the Micro Deval Apparatus

ASTM D 7428

Grading	Sample Mass Before Test (grams)	Sample Mass After Test (grams)	Percent Loss (%)	Specification CDOT
Fine Agg	500.0	452.1	9.6	18% max.

## Penrose Pit

## Washed Concrete Sand

## Soundness by Use of Magnesium Sulfate

ASTM C 88

Sieve Size	Original Sample Individual % Retained		Mass of Individual Test Fraction (grams)	Mass of Combined Test Fraction (grams)		Percent Passing Designated Sieve After Test	Weighted Percent Loss (%)
				Before	After		
3/8" to No. 4	1	1	-	-	-	0.0	0.0
No. 4 to No. 8	13	13	100.0	100.0	87.2	12.8	1.7
No. 8 to No. 16	21	21	100.0	100.0	89.5	10.5	2.2
No. 16 to No. 30	20	20	100.0	100.0	89.2	10.8	2.2
No. 30 to No. 50	26	26	100.0	100.0	91.9	8.1	2.1
Minus No. 50	19	19	-	-	-	-	0.0
Total	100	100%	of fine aggregate fraction				8
Specification - ASTM C 33							15% max.

## Clay Lumps and Friable Particles

ASTM C 142

Sieve Size	Original Sample Individual % Retained		Mass of Combined Test Fraction (grams)		Percent Passing Designated Sieve After Test	Weighted Percent Loss (%)
			Before	After		
No. 4 to No. 16	34	34	100.0	99.8	0.2	0.1
Total	34%					0.3
Specification - ASTM C 33 (Class 5S)						2.0% max.

## Lightweight Particles

ASTM C 123

Sieve Size	Specific Gravity of Heavy Liquid	Mass of Test Sample (grams)	Mass of Floating Particles (grams)	Percent of Lightweight Pieces (%)	Specification ASTM C 33
Plus No. 4	2.0	200	0.0	0.0	0.5% max.

## Sand Equivalent Value of Soils and Fine Aggregate

ASTM D 2419

	Specimen 1	Specimen 2	Specimen 3
Sand Reading	3.5	3.5	3.4
Clay Reading	4.4	4.3	4.4
Sand Equivalent	80	82	78

Average SE Value	80
------------------	----

## Organic Impurities in Fine Aggregate

ASTM C 40

Organic Plate Number
Plate Number 1



# CHRYSO® Air TX



## New generation air entrainer

### ■ Features

**CHRYSO® Air TX** is an aqueous solution specially formulated for use as an air entraining admixture for concrete. It introduces millions of uniformly sized and spaced air voids throughout the concrete mixture. Concrete containing this type of uniformly distributed air voids has been proven far more resistant to freezing and thawing than plain concrete.

**CHRYSO® Air TX** improves concrete's rheology, finishability and resistance to freeze-thaw and surface deterioration caused by deicing chemicals.

**CHRYSO® Air TX** is manufactured under rigid quality control measures to provide uniform, reliable results.

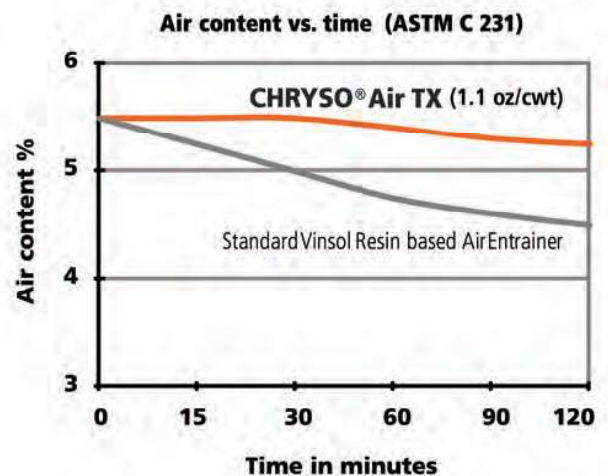
### ■ Benefits

- Improves concrete quality by decreasing water-cement ratio for a given degree of workability
- Increases concrete durability through reducing sensitivity to freeze-thaw & surface deterioration caused by deicing salts
- Improves the plasticity and workability of concrete
- Reduces concrete permeability
- Reduces segregation
- Improves surface paste qualities for superior and smoother finish
- Improves pumpability of concrete
- Enhance the resistance of concrete to segregation and reduces honeycombing
- Limits bleeding

### ■ Areas of Application

**CHRYSO® Air TX** is recommended for all concrete mixes where improved resistance to freeze-thaw, superior workability, improved pumpability and enhanced finish characteristics are desirable.

**CHRYSO® Air TX** is especially beneficial when concrete is to be exposed to freezing and thawing conditions.





# CHRYSO® Air TX

## ■ Description:

### Characteristics:

Physical state: liquid  
Color: green to brown shade  
Density:  $1.01 \pm 0.010$  g/cc  
pH:  $12 \pm 1.0$   
Cl<sup>-</sup> ion content: Nil

**CHRYSO® Air TX** does not contain any purposely added calcium chloride or other chloride based components. It will not promote or contribute to corrosion of reinforcing steel in concrete.

### Packaging:

—55 gallon (210 L) drums  
—264 gallon (1000 L) totes  
—bulk deliveries

### Standard specifications:

Conforms to ASTM C 260  
AASHTO M 154  
CRD C 13

## ■ Directions for use:

### Dosage

There is no standard dosage rate for **CHRYSO® Air TX**

**CHRYSO® Air TX** is typically used at a dosage rate of 0.5 to 2 fluid ounces per 100 pounds (33 to 130 ml per 100 kg) of cement.

Because local job conditions vary, please contact your local Chryso sales representative for further assistance if using outside recommended dosage ranges.

## Compatibility

**CHRYSO® Air TX** is compatible with all types of Portland cement, class C and F fly ash, slag, microsilica, calcium chloride, fibers and other approved **CHRYSO** admixtures.

**CHRYSO® Air TX** can be used in all white, colored, and architectural concrete. For best results, each admixture must be dispensed separately into the concrete mix.

## Precaution:

**CHRYSO® Air TX** may freeze at temperatures below 35°F (2°C). Although freezing does not harm **CHRYSO® Air TX**, precautions should be taken to protect it from freezing. If **CHRYSO® Air TX** should happen to freeze, thaw and reconstitute with mechanical agitation.

**Do Not Use Pressurized Air For Agitation.**

Shelf life: 9 months.

## ■ Safety:

**CHRYSO® Air TX** is an alkaline solution and therefore can cause moderate to severe irritation. Please refer to the material safety data sheet for additional information.

## About CHRYSO:

**CHRYSO** is a subsidiary of the multi-billion dollar specialty construction chemicals Group, Materis.

Worldwide leader for Concrete and Cement additives, **CHRYSO** has been servicing the construction industry for over half a century with outstanding innovation and service.

As a result, **CHRYSO's** name and products have been associated with the most prestigious and demanding construction projects worldwide.

Respectful of the environment, **CHRYSO** continually develops and produces innovative and effective solutions for the cement and concrete industries.

**CHRYSO Inc.** Tel: (800) 557-4220 | Fax: (812) 256-4235

**CHRYSO Eastern Division:** P.O. Box 129 | Charlestown, IN | 47111-0459

**CHRYSO Western Division:** P.O. Box 190 | Rockwall, TX | 75087

The information contained in this document is given to the best of our knowledge and is the result of extensive and controlled testing. However, it cannot under any circumstances be considered as a warranty involving our liability in the case of misuse. Tests should be conducted before the product is used to ensure that the methods and conditions of use of the product are satisfactory. Our specialists remain at the disposal of customers if they require help with the application of the product for their specific needs.

**CHRYSO**  
www.chryso.com

# CHRYSO® Quad 842



## Uniformity Enhancer - Rheology Modifier – Water Reducer

### ■ Overview

CHRYSO® Quad 842 is a breakthrough in chemical admixtures, utilizing the latest molecular synthesis technology from the CHRYSO® Synthesis Lab, combining patented CHRYSO® technologies into one, user focused solution.

CHRYSO® Quad 842 is engineered to address the challenges of today's more variable concrete materials, enabling consistent desired concrete properties while providing maximum performance across a broad range of dosage rates and workability demands.

CHRYSO® Quad 842 greatly enhances paste quality and lubricity when using coarsely graded sand thanks to the CHRYSO® Quad component of the formulation,

Engineered for water reduction, slump retention and ultimate strength, CHRYSO® Quad 842 utilizes patented CHRYSO® synthesized molecules to provide a true full range water reducer for maximum versatility, performance and economy.

### ■ Features & Benefits

- Excellent slump retention reducing risk of jobsite water addition
- World class air control, reducing QC time, expense, lost loads
- Enables the use of high proportions of manufactured sand
- Proprietary finishing aid provides superior workability and finishability, improved lubricity (pumpability, consolidation, finishability)
- Faster placements, improved jobsite and equipment efficiency
- More robust when using sand containing a high amount of fines
- Early strength = project acceleration
- Reduced potential for shrinkage cracks
- Higher early and ultimate strengths
- Wide range of water reduction at same set time, offering maximum versatility with one product, one tank, fewer variables

CHRYSO® Quad 842 is recommended for use in Ready Mixed Concrete where improved efficiency (more psi/pound) of cement and SCM is desired for quality, economy and environmental responsibility.

CHRYSO® Quad 842 is recommended for all Ready Mixed Concrete to improve rheology and paste quality & lubricity, especially where more harsh aggregates are used.

CHRYSO® Quad 842 is recommended for all Ready Mixed Concrete where superior robustness is desired, offering less sensitivity to variations of aggregate gradations, clay content, aggregate moisture, cement variability, etc.

CHRYSO® Quad 842 is recommended for use in Ready Mixed Concrete mixes to improve uniformity and control of air content, set time and slump retention.



# CHRYSO



# CHRYSO® Quad 842

## ■ Description:

### Characteristics:

Physical state: Liquid

Color: Brown

Density: Approx. 1.05

pH: Approx. 4.0

Cl<sup>-</sup> ion content: Nil

**CHRYSO® Quad 842** does not contain any purposely added calcium chloride or other chloride based components. It will not promote or contribute to corrosion of reinforcing steel in concrete.

### Packaging:

- 55 gallon (210 L) drums
- 264 gallon (1000 L) totes
- bulk deliveries

### Standard specifications:

Conforms to ASTM C 494 Type A & F

AASHTO M 194 Type A & F

## ■ Directions for use:

### Dosage

**CHRYSO® Quad 842** is recommended for use at a dosage rate of 2 to 10 fluid ounces per 100 pounds (130 to 652 ml per 100 kg) of cement for a Type A and 6 to 20 fluid ounces per 100 pounds (391 to 1304 ml per 100 kg) of cement for a Type F.

**CHRYSO® Quad 842** can be added at the concrete plant with either the initial or tail water and allowed to mix 3 - 5 minutes. If **CHRYSO® Quad 842** is added at the job site the concrete should be mixed a minimum of 3 minutes before discharge.

Because local job conditions vary, please contact your local Chryso sales representative for further assistance if using outside recommended dosage ranges.

**CHRYSO Inc.** Tel: (800) 936-7553 – Fax: 972-772-6010

<b>Southern Division</b>	<b>P.O. Box 190</b>	<b>Rockwall, TX</b>	<b>75032</b>
<b>Midwest Division</b>	<b>P.O. Box 129</b>	<b>Charlestown, IN</b>	<b>47111</b>
<b>Western Division</b>	<b>5090 Nome St</b>	<b>Denver, CO</b>	<b>80239</b>
<b>Southeast Division</b>	<b>4590 Draine Field Rd</b>	<b>Lakeland, FL</b>	<b>33811</b>

## Compatibility

**CHRYSO® Quad 842** is compatible with all types of Portland cement, class C and F fly ash, slag, microsilica, calcium chloride, fibers and approved air entraining admixtures.

**CHRYSO® Quad 842** is compatible with most admixtures and can be used with other **CHRYSO®** admixtures, unless stated otherwise. For best results, each admixture must be dispensed separately into the concrete mix.

**CHRYSO® Quad 842** can be used in all white, colored, and architectural concrete. For best results, each admixture must be dispensed separately into the concrete mix.

## Precaution:

**CHRYSO® Quad 842** may freeze at temperatures below 32°F (0°C). Freezing will damage **CHRYSO® Quad 842** and precautions should be taken to protect it from freezing.

If **CHRYSO® Quad 842** should happen to freeze the product can be reconstituted with mechanical agitation. Do not store the product at temperatures above 100°F (38°C) or under 33°F (1°C) for long periods.

**Do Not Use Pressurized Air For Agitation**

Shelf life: 9 months.

## ■ Safety:

**CHRYSO® Quad 842** is not considered dangerous to handle. Please refer to the material safety data sheet for additional information.

### About CHRYSO:

**CHRYSO®** is a worldwide leader for Concrete and Cement additives, **CHRYSO®** has been servicing the construction Industry for over half a century with outstanding innovation and service. As a result, **CHRYSO®**'s name and products have been associated with the most prestigious and demanding construction projects worldwide.

# CHRYSO

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

The information contained in this document is given to the best of our knowledge and is the result of extensive and controlled testing. However, it cannot under any circumstances be considered as a warranty involving our liability in the case of misuse. Tests should be conducted before the product is used to ensure that the methods and conditions of use of the product are satisfactory. Our specialists remain at the disposal of customers if they require help with the application of the product for their specific needs.