



**Central Plains  
Cement Company**

# **2014 Nebraska Blended Cements Specification Industry Perspective**

National Concrete Consortium  
April 23, 2014

**Consistent Eye On Quality.**



# Prescriptive vs. Performance

- **Who will benefit from these changes?**
  - **Owner**
    - Improving concrete longevity
    - Extending SCM's
    - F Ash availability unknown 2016 – cost
  - **Supplier/contractor**
    - Product performance
- **Sustainability**
  - Extending the life of SCM's
    - Utilizing local Class C Ash
  - CO2 Reduction



# NDOR Specification

- **Supplier would provide Alkali Silica Reaction (ASR) testing**
  - (ASTM C 1567 less than 0.10% @ 28 days)
  - Platte River and Norfolk aggregate
  - NDOR verify ASTM C 1567
- **Total Cement Replacement with SCM's**
  - 20% min
  - 40% max



# NDOR Specification

- **NDOR will allow the use IP and IT cement in accordance with ASTM C595**
- **NDOR will allow the use of ASTM C 1697-  
Standard Specification for Blended  
Supplementary Cementitious Materials**



# Brain Storming/Product Availability

- **ASTM C-618 pozzolan**
  - **Class F Ash**
    - **25% replacement**
  - **Natural Pozzolan**
    - **20% replacement**
  - **Class C Ash**
    - **Unable to meet requirements**
- **ASTM C-989 Slag Cement**
  - **40% replacement**
- **ASTM C-595**
  - **IL Cements –**
    - **Unable to meet requirements**
  - **IT Cements–**
    - **unlimited amount of options**
- **ASTM C-1697 blended pozzolan**
  - **Class F blended with a Local class C ash**

# NDOR Submittal

- Material Source Information
  - Associated future product name.
    - EaglePave
  - Source and type of SCM's.
    - **EaglePozz SCMb – 50F/50C (F-Ash)/(C-Ash) – ASTM C-1697**
    - **Slag Cement Grade 120 – ASTM C-989**
  - Individual blended SCM's percentage per ASTM C 595.
    - **ASTM C-595 IT (P25) (S10)**



# ASTM C-1697

## EaglePozz Calculator

Directions: Fill in the yellow cells. % Fly Ash is shown below.

Curve Data		
	F-Ash	C-Ash
SiO2	45.00	35.20
Al2O3	22.21	19.20
Fe2O3	19.83	5.90
CaO	1.76	27.30
SO3	0.91	1.70
MGO	0.90	5.00
LOI	1.82	0.20
Date Sampled	10/16/12	11/6/12

SuperAsh Sample Data	
SiO2	40.10
Al2O3	20.70
CaO	14.53

% Fly Ash	=	50.1%
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**FLY ASH SOURCE:** EaglePozz SCMb-50F/50C  
**COMPOSITE DATE:** 13-May to 13-May-13  
**SAMPLE IDENTIFICATION:** XXX130513-0513

			SPECIFICATIONS	
			ASTM C618	ASTM C1697
<u>CHEMICAL ANALYSIS</u>			<u>CLASS F</u>	
SiO <sub>2</sub> (silicon dioxide), %	=	42.69		
Al <sub>2</sub> O <sub>3</sub> (aluminum oxide), %	=	20.47		
Fe <sub>2</sub> O <sub>3</sub> (iron oxide), %	=	13.68		
SiO <sub>2</sub> +Al <sub>2</sub> O <sub>3</sub> +Fe <sub>2</sub> O <sub>3</sub> , %	=	76.8	70 Min	
CaO (calcium oxide), %	=	12.57		
MgO (magnesium oxide), %	=	2.81		
SO <sub>3</sub> (sulfur trioxide), %	=	1.23	5.0 Max	
Moisture content, %	=	0.17	3.0 Max	
Loss On Ignition, %	=	0.92	6.0 Max	
Na <sub>2</sub> O (sodium oxide), %	=	1.08		
K <sub>2</sub> O (potassium oxide), %	=	1.41		
<u>PHYSICAL ANALYSIS</u>				
Fineness, amount retained on #325 sieve, %	=	16.1	34 Max	Report only
Density, Mg/m <sup>3</sup>	=	2.59		
Strength Activity Index with Portland Cement at 7 days, % of cement control	=	93	75 Min	75 Min
<small>Cement: Lafarge Sugar Creek Type I/II</small>				
Water Requirement % of cement control	=	95	105 Max	Report only
Soundness, autoclave expansion or contraction, %	=	0.00	0.8 Max	0.8 Max



# EaglePave Calculator

Directions: Fill in the yellow cells. % Fly Ash and Slag are shown below.

Curve Data			
	Cement	Fly Ash	Slag
SiO <sub>2</sub>	20.10	43.69	35.17
Al <sub>2</sub> O <sub>3</sub>	4.60	21.45	10.31
Fe <sub>2</sub> O <sub>3</sub>	3.10	12.31	0.45
CaO	63.60	12.57	38.28
SO <sub>3</sub>	3.00	1.23	2.47
MGO	1.20	2.62	11.05
LOI	2.50	0.92	0.00
Date Sampled	11/13/13	11/13/13	11/1/13

EaglePave Sample Data	
SiO <sub>2</sub>	27.80
Al <sub>2</sub> O <sub>3</sub>	9.40
CaO	49.10
MgO	2.60
CaO/SiO <sub>2</sub>	1.8

<b>% Slag Cement</b>	=	<b>6%</b>
<b>% Fly Ash</b>	=	<b>29.8%</b>
<b>% Cement</b>	=	<b>64.1%</b>

# EaglePave Mill Test Report

Month of Issue: Sep-13

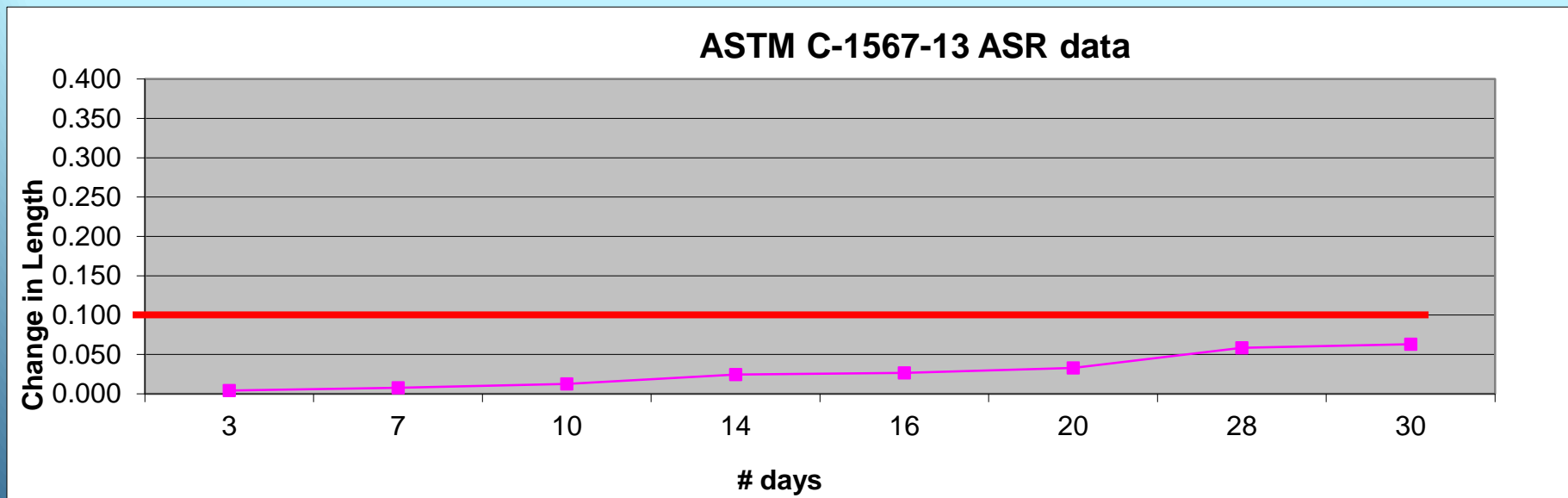
Plant: Omaha Terminal  
 Product: Type IT (P25)(S10)  
 Manufactured: Sep-13

The current version of ASTM C 595 and AASHTO M 240 Standard Requirements

CHEMICAL ANALYSIS			PHYSICAL ANALYSIS		
Item	Spec limit	Test Result	Item	Spec limit	Test Result
<i>Rapid Method, X-Ray (C 114)</i>					
SiO <sub>2</sub> (%)	---	27.8	Air content of mortar (%) (C 195)	12 max	8
Al <sub>2</sub> O <sub>3</sub> (%)	---	9.4	Blaine Fineness (m <sup>2</sup> /kg) (C 204)	---	354
Fe <sub>2</sub> O <sub>3</sub> (%)	---	5.1	Fineness, Residue retained on a 45 um sieve (%) sieve (%)	---	6.8
CaO (%)	---	49.1	Autoclave expansion (%) (C 151)	1.80 max -0.20 min	0.01
MgO (%)	6.0 max	2.6	Compressive strength (MPa, PSI) (C 109)		
Sulphate as SO <sub>3</sub> (%)	4.0 max	2.6	3 days	13.0 (1890) min	18.3 [ 2654 ]
Loss on ignition (%)	5.0 max	1.8	7 days	20.0 (2900) min	25.8 [ 3741 ]
Total Alkalis	---	0.90	28 days (Reflects previous month's data)	25.0 (3620) min	41.9 [ 6076 ]
			Time of setting (minutes)		
			Vicat Initial (C 191)	45 - 420	186
			Specific Gravity (C168)	---	2.90

ASTM C 1567-13 ASR Testing Data Report

<b>Date Cast</b>	<b>092013-1</b>
<b>Sample Contents</b>	<b>EaglePave EaglePave composite 100% Elkhorn Sand</b>
<b>Average % Change in Length</b>	
<b>Day#</b>	
<b>3</b>	<b>0.004</b>
<b>7</b>	<b>0.008</b>
<b>10</b>	<b>0.013</b>
<b>14</b>	<b>0.025</b>
<b>16</b>	<b>0.027</b>
<b>20</b>	<b>0.033</b>
<b>28</b>	<b>0.059</b>
<b>30</b>	<b>0.063</b>



# EaglePave Concrete Results - Field Trial

Cylinders cast on 9-12-13

NDOR 47B 3500 PSI

	<u>PSI</u>			
1 Day	1,348		Slump	5.5 inch
1 Day	1,379		Air	8%
1 Day	1,453		Unit Wiegth	139#
1 Day Average	1,393		Yield	101.8%
3 Day	3,453			
3 Day	3,378			
3 Day	2,918			
3 Day Average	3,250			
7 Day	3,481			
7 Day	3,349			
7 Day	3,898			
7 Day Average	3,576			
14 Day	4,211			
14 Day	4,682			
14 Day	4,832			
14 Day Average	4,575			
28 Day	5,563			
28 Day	5,489			
28 Day	4,759			
28 Day Average	5,270			
56 Day	6,382			
56 Day	6,239			
56 Day	6,108			
56 Day Average	6,243			

# QUESTIONS?

