

**PARTICLE PLUGGING APPARATUS TESTING OF BRIDGING
MATERIALS IN A CEMENT SLURRY**

REVISED FINAL REPORT

Prepared for

WELDRIL PRODUCTS

By

Intertek Westport Technology Center

6700 Portwest Drive

Houston, Texas 77024

(713) 479-8400 (Phone)

(713) 864-9357 (Fax)

www.westport1.com

February 24, 2015

TESTING OF BRIDGING MATERIALS

TABLE OF CONTENTS	i
List of Tables	ii
INTRODUCTION	1
EXPERIMENTAL	1
RESULTS AND DISCUSSION	1

LIST OF TABLES

TABLE 1	RESULTS OF THE PARTICLE PLUGGING APPARATUS TESTING OF BRIDGING MATERIALS IN CEMENT SLURRY USING A 1 MILLIMETER SLOTTED DISC	2
TABLE 2	RESULTS OF THE PARTICLE PLUGGING APPARATUS TESTING OF BRIDGING MATERIALS IN CEMENT SLURRY USING A 2 MILLIMETER SLOTTED DISC	2
TABLE 3	INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 0.5% CELLOFLAKE	3
TABLE 4	INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 1% CELLOFLAKE	3
TABLE 5	INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 0.5% POL-E-FLAKE	4
TABLE 6	INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 1% POL-E-FLAKE	4

INTRODUCTION

Intertek Westport Technology Center was contracted by Weldril to conduct particle plugging apparatus testing utilizing two bridging materials (Celloflake and POL-E-FLAKE) at two concentrations (0.50 weight percent and 1 weight percent) in a cement slurry. After cement slurry preparation, particle plugging apparatus testing was conducted utilizing each cement slurry using 1 millimeter and 2 millimeter slotted discs.

EXPERIMENTAL

CEMENT SLURRY PREPARATION

Four cement slurries were prepared following the instructions given in Tables 3-6

MODIFIED API RECOMMENDED PRACTICE 13I BRIDGING MATERIALS TESTING

300 to 350 milliliters of cement slurry was added to the particle plugging apparatus cylinder with the cell outlet valve closed. The pressure applied to the cylinder was increased to 100 psi after which the cell outlet valve was opened. Whether or not a seal was formed was noted as well as the amount of cement slurry discharged. If a seal was formed the test was repeated with the pressure increased first to 500 psi and held for 10 minutes and then repeated with the pressure increased to 1000 psi and held for 10 minutes.

RESULTS AND DISCUSSION

The results of the particle plugging apparatus testing of two bridging materials (Celloflake and Pol-E-Flake) at two concentrations (0.5 weight percent and 1 weight percent) in a cement slurry are presented in Tables 1-2.

TABLE 1
RESULTS OF THE PARTICLE PLUGGING APPARATUS TESTING OF BRIDGING MATERIALS IN CEMENT SLURRY USING A 1 MILLIMETER SLOTTED DISC

Bridging Material	Concentration of Bridging Material Added	Pressure PPA Test Conducted at	Seal Obtained?	Volume of Cement Slurry Discharged	Volume of Cement Added to Cylinder
	weight percent	psi		mL	mL
Celloflake	0.5	100	no	300.0	300.0
Celloflake	1	100	no	300.0	300.0
Pol-E-Flake	0.5	100	yes	275.0	340.0
Pol-E-Flake	1	100	yes	50.0	325.0
Pol-E-Flake	0.5	500	yes	275.0	340.0
Pol-E-Flake	1	500	yes	50.0	325.0
Pol-E-Flake	0.5	1000	yes	275.0	340.0
Pol-E-Flake	1	1000	yes	50.0	325.0

TABLE 2
RESULTS OF THE PARTICLE PLUGGING APPARATUS TESTING OF BRIDGING MATERIALS IN CEMENT SLURRY USING A 2 MILLIMETER SLOTTED DISC

Bridging Material	Concentration of Bridging Material Added	Pressure PPA Test Conducted at	Seal Obtained?	Volume of Cement Slurry Discharged	Volume of Cement Added to Cylinder
	weight percent	psi		mL	mL
Pol-E-Flake	0.5	100	no	300.0	300.0
Pol-E-Flake	1	100	no	300.0	300.0

WTC-14-004818 - WELDRIL - PARTICLE PLUGGING APPARATUS TESTING OF BRIDGING MATERIALS IN A CEMENT SLURRY

**TABLE 3
INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 0.5% CELLOFLAKE**

Material	Amount Added	Comments
Fresh Water	201.13 grams	
Cement	457.37 grams	
Celloflake	2.29 grams	
FL-66	4.56 grams	
R-3	4.56 grams	Mix the cement slurry for 5 minutes at 12000 rpm using a Waring Blender

**TABLE 4
INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 1% CELLOFLAKE**

Material	Amount Added	Comments
Fresh Water	198.46 grams	
Cement	455.56 grams	
Celloflake	4.56 grams	
FL-66	4.56 grams	
R-3	4.56 grams	Mix the cement slurry for 5 minutes at 12000 rpm using a Waring Blender

WTC-14-004818 - WELDRIL - PARTICLE PLUGGING APPARATUS TESTING OF BRIDGING MATERIALS IN A CEMENT SLURRY

**TABLE 5
INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 0.5% POL-E-FLAKE**

Material	Amount Added	Comments
Fresh Water	196.44 grams	
Cement	454.36 grams	
POL-E-FLAKE	2.27 grams	
FL-66	5.45 grams	
R-3	4.54 grams	Mix the cement slurry for 5 minutes at 12000 rpm using a Waring Blender

**TABLE 6
INSTRUCTIONS FOR PREPARATION OF CEMENT SLURRY CONTAINING 1% POL-E-FLAKE**

Material	Amount Added	Comments
Fresh Water	194.93 grams	
Cement	453.62 grams	
POL-E-FLAKE	4.54 grams	
FL-66	5.44 grams	
R-3	4.54 grams	Mix the cement slurry for 5 minutes at 12000 rpm using a Waring Blender