



October 10, 2019

Email: [martin@hamiltonmaterialsenineering.ca](mailto:martin@hamiltonmaterialsenineering.ca)

Mr. Martin Rittau  
Materials Characterization and Corrosion Specialist  
RPS Materials Services  
McMaster Innovation Park  
175 Longwood Road South, Suite 416A-5  
Hamilton, Ontario Canada L8P 0A1  
289-426-1844

**SUBJECT: Results of SSPC-AB 1 Testing of Abrasive Material;  
KTA-Tator, Inc. Project No. 390731**

Dear Mr. Rittau:

In accordance with KTA-Tator, Inc. (KTA) Proposal Number PN1910332, a signed copy of the Authorization to Proceed (ATP) form, and wire transfer payment received in full on September 23, 2019, KTA has performed testing on one abrasive material in accordance with qualification sections of SSPC-AB 1, "Mineral and Slag Abrasives" (January 12, 2015, with Editorial Revision May 6, 2019). This report describes the testing procedures employed and contains the results of the testing.

## **SAMPLES**

One bag of synthetic garnet abrasive material (Duramax) was received by KTA from RPS Materials on September 9, 2019. It should be noted that at no time did KTA personnel witness the manufacturing, or acquisition of the abrasive sample.

## **LABORATORY INVESTIGATION**

The laboratory investigation consisted of testing one abrasive (Duramax) for specific gravity, hardness, weight change on ignition, water soluble contaminants, moisture content, oil content, crystalline silica content, surface profile, particle size distribution, and leachate test (TCLP) in accordance with sections of the qualification test requirements of SSPC-AB 1 Section 4.1 (January 12, 2015, with Editorial Revision May 6, 2019).



## Specific Gravity

Specific gravity was determined in accordance with Section 4.1.1 of SSPC-AB 1 and ASTM C128-15, "Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate." Briefly, a pycnometer was used to determine the volume of abrasive and displaced water via the Gravimetric Procedure.

**SSPC-AB 1 Requirement:** *Specific gravity of 2.5 for mineral or slag abrasives, minimum*

**Sample Performance:** 390731-1: *Specific gravity of 3.4; Abrasive sample met the requirement*

## Hardness

Hardness testing was performed in accordance with Section 4.1.2 of SSPC-AB 1. Briefly, to obtain a representative test sample, five grams of the submitted abrasive sample was examined using a microscope at 10X magnification. A few grains representing each color and shape were chosen and placed on a glass slide. A second glass slide was then placed on top of the selected abrasive. Moderate pressure was used to push and move the second slide over the abrasive for 10 seconds. The glass slides were then examined for scratches. If at least 75% of the grains are found to scratch the glass slides, then the abrasive is rated as having a minimum hardness of 6 on the Mohs scale.

**SSPC-AB 1 Requirement:** *75% of grains scratch glass*

**Sample Performance:** 390731-1: *100% of grains scratched glass; Abrasive sample met the requirement*

## Weight Change on Ignition

Weight change on ignition testing was performed in accordance with Section 4.1.3 of SSPC-AB 1. A representative sample of the abrasive was dried in an oven for one hour at  $105 \pm 5^\circ\text{C}$ . One gram of the dried abrasive was placed into a crucible. The crucible containing the abrasive sample was placed into a muffle furnace at  $750 \pm 50^\circ\text{C}$  for approximately 30 minutes, allowed to cool to room temperature in a desiccator and then reweighed. The percent weight change was then calculated.

**SSPC-AB 1 Requirement:** *1.0% loss, maximum, 5.0% gain, maximum*

**Sample Performance:** 390731-1: *0.1% gain; Abrasive sample met the requirement*



### Conductivity (Water Soluble Contaminants)

Conductivity testing was performed in accordance with Section 4.1.4 of SSPC-AB 1, and ASTM D4940-15e1, "Standard Test Method for Conductimetric Analysis of Water-Soluble Ionic Contamination of Blasting Abrasives." A slurry of the sample was prepared with 300 mL of distilled water and 300 mL of sample material, which was then stirred for one minute. The slurry was allowed to settle for eight minutes and was stirred again, then filtered. The supernatant liquid removed from the slurry was then tested using an Oakton<sup>®</sup> COND 6+ conductivity meter.

**SSPC-AB 1 Requirement:** *1000  $\mu$ S/cm, maximum*

**Sample Performance:** 390731-1: *127.5  $\mu$ S/cm; Abrasive sample met the requirement*

### Moisture Content

The moisture content was determined in accordance with Section 4.1.5 of SSPC-AB 1 and ASTM C566-19, "Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying." Approximately 250 grams of the abrasive was weighed and dried in an oven set at 105  $\pm$  5  $^{\circ}$ C until a constant weight was achieved. The percent moisture content was then calculated.

**SSPC-AB 1 Requirement:** *0.5%, maximum*

**Sample Performance:** 390731-1: *0.0%; Abrasive sample met the requirement*

### Oil Content

Oil content testing was conducted in accordance with SSPC-AB 1, Section 4.1.6 and ASTM D7393-16, "Standard Practice for Indicating Oil in Abrasives." For this testing, a slurry composed of 100 ml of abrasive material and the required amount of deionized water was prepared using a 250-ml sealed flask and shaken vigorously for one minute. The slurry was allowed to settle for five minutes and then examined for oil sheen, oil droplets, and oil as an emulsion.

**SSPC-AB 1 Requirement:** *Slurry will show no oil on the surface of the water or as an emulsion*

**Sample Performance:** *No oil sheen, oil droplets or oil as an emulsion observed; Abrasive sample met the requirement*



### Crystalline Silica Content

The crystalline silica content was subcontracted to Clark Testing of Jefferson Hills, Pennsylvania for determination according to NIOSH Method 7500. The Clark Testing report containing the results of testing is provided in Appendix 1.

**SSPC-AB 1 Requirement:** *Class A (Less than 1.0% crystalline silica), Class B (Less than 5.0% crystalline silica), Class C - Unrestricted crystalline silica*

**Sample Performance:** 390731-1: *<0.1% Cristobalite, <0.1% Quartz, <0.1% Tridymite; Designated as Class A (see Appendix 1)*

### Surface Profile

The surface profile was determined in accordance with SSPC-AB 1, Section 4.1.8. A 2' x 2' x  $\frac{3}{16}$ " steel plate (with intact mill scale) with an average Rockwell hardness of 76 HRBW was blasted at  $95 \pm 5$  psi with a #4 Venturi nozzle at a distance of approximately 18 inches and an angle of approximately  $90^\circ$ . The surface profile depth was measured in three areas in accordance with ASTM D4417-14, "Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel," Method C (replica tape). Surface profile measurements were obtained using Testex™ X-Coarse (1.5 – 4.5 mils) replica tape. Each area was measured in duplicate. The average surface profile is listed below.

**SSPC-AB 1 Requirement:** *None*

**Classifications:** *Grade 1 (0.5 – 1.5 mils), Grade 2 (1.0 – 2.5 mils), Grade 3 (2.0 – 3.5 mils), Grade 4 (3.0 – 5.0 mils), Grade 5 (4.0 – 6.0 mils)*

**Sample Performance:** 390731-1: *Average of 3.9 mils; Grade 4*

### Particle Size Determination (Sieve Analysis)

A sieve analysis was performed in accordance with SSPC-AB 1, Section 4.1.9.1 and ASTM C136-14, "Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates." A 150-gram sample of the abrasive was collected and was tamped through a series of sieves (screen numbers 6, 10, 16, 20, 40, 50, 70, 100, 120, 140, 170, 200, 270, and a pan at the bottom) for seven minutes using an automated tamper. The abrasive collected on each screen was emptied into numbered and tared sample cups. The underside of each screen was cleaned with a brass brush to loosen any trapped particles, which were also collected into the appropriate sample cups. The contents of each sample cup were weighed and documented. The test was performed in duplicate. The raw data for the sieve analysis is provided in Appendix 2, "KTA Sieve Analysis Data Forms."



SSPC-AB 1 Requirement: None

Sample Performance: 390731-1: *0.63 mm Average Particle Size*

### Leachate Test (TCLP)

The leachate test (TCLP) was subcontracted to Schneider Laboratories Global, Inc. of Richmond, Virginia, for metals analysis. The Schneider Laboratories Global, Inc. report containing the results of testing is provided in Appendix 3, "Schneider Laboratory Global, Inc. Report."

If you have any questions concerning the testing or this report, please contact me by telephone at 412.788.1300 extension 299 or by email me at [cquatman@kta.com](mailto:cquatman@kta.com).

Sincerely,

KTA-TATOR, INC.

A handwritten signature in blue ink that reads "Chad S. Quatman". The signature is fluid and cursive.

Chad S. Quatman

*Project Manager/Coatings Application Specialist*

### Appendices:

- 1 – Clark Testing Report
- 2 – KTA Sieve Analysis Data Forms
- 3 – Schneider Laboratory Global, Inc. Report

CSQ/JEB:edg

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**NOTICE:** This report represents the opinion of KTA-TATOR, INC. This report is issued in conformance with generally accepted industry practices. While customary precautions were taken to verify the information gathered and presented is accurate, complete and technically correct, this report is based on the information, data, time, materials, and/or samples afforded. This report should not be reproduced except in full.

# *Appendix 1*



**Clark Testing-Analytical Chemistry**

1801 Route 51 South  
Jefferson H., PA 15025  
Phone: 412-387-1656 Fax: 412-387-1012

10/09/2019

Final

**Report of Test Results**

Quatman- Silica

Contact: Chad Quatman  
Address: KTA-Tator, Inc.  
Chad Quatman  
115 Technology Dr.  
Pittsburgh, PA 15275

Tracking Sheet Number: 19-18690  
Customer P.O. Number: 19PO-626  
Date Received: 10/02/2019

Test Name	Test Method	Analyte	Result	Units	Test Date
Sample No: 1972208	Customer ID:	390731-1			
Crystalline Silica	NIOSH 7500	Cristobalite	< 0.1	wt. %	10/08
	NIOSH 7500	Quartz	< 0.1	wt. %	10/08
	NIOSH 7500	Tridymite	< 0.1	wt. %	10/08

This report shall not be reproduced except in full, without the written approval of Clark Laboratories.  
The reported test results relate only to the item(s) tested.

Approved By:

Date:

10/09/19

end of report

# *Appendix 2*





TL2399F1

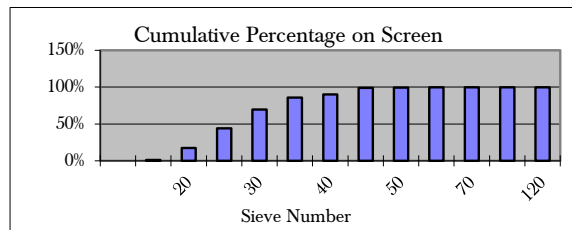
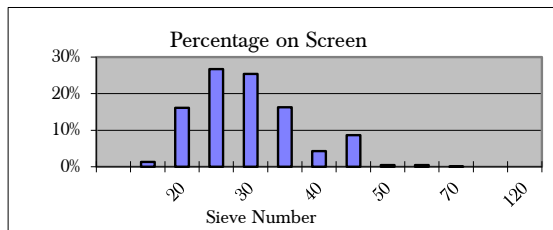
KTA-Tator, Inc. Sieve Analysis Data Form

Sample ID No.: 390731-1 20/45 Date: 10/8/2019  
 Sample Description: RPS Materials Initial Technician: CSQ  
 Initial Sample Mass (g): 150.57 Run - 1 "India"

US Standard Sieve No.	Retained Sample (g)	% of Total	Cumulative % of Total	Nominal Sieve Opening Size (mm)	Retained Sample (g) Opening (mm)
		0.000%	0.000%	3.350	0.000
18	2.040	1.355%	1.355%	1.000	2.040
20	24.27	16.12%	17.47%	0.850	20.63
25	40.23	26.72%	44.19%	0.710	28.56
30	38.21	25.38%	69.57%	0.600	22.93
35	24.56	16.31%	85.88%	0.500	12.28
40	6.490	4.310%	90.19%	0.425	2.758
45	13.00	8.634%	98.82%	0.354	4.602
50	0.670	0.445%	99.27%	0.300	0.201
60	0.680	0.452%	99.72%	0.250	0.170
70	0.010	0.007%	99.73%	0.212	0.002
80	0.000	0.000%	99.73%	0.180	0.000
120	0.000	0.000%	99.73%	0.125	0.000
*Pan	0.000	0.000%	99.73%	0.038	0.000
Total	150.2			Sum =	94.17

\* Approximated as a #400 Sieve

Average particle size (mm) = 0.63





TL2399F1

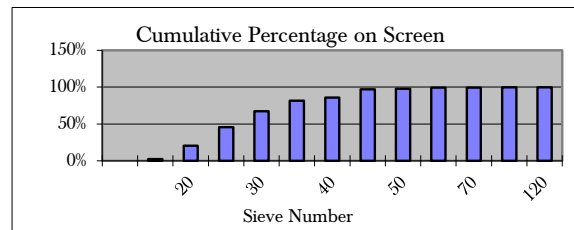
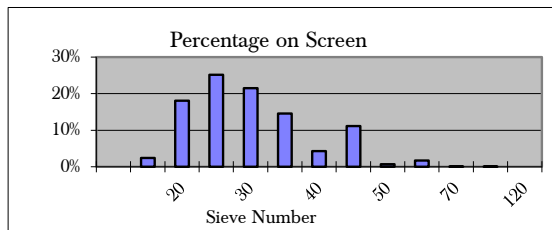
**KTA-Tator, Inc. Sieve Analysis Data Form**

Sample ID No.: 390731-1      20/45      Date: 10/8/2019  
 Sample Description: RPS Materials      Initial      Technician: CSQ  
 Initial Sample Mass (g): 150.12      Run - 2      "India"

US Standard Sieve No.	Retained Sample (g)	% of Total	Cumulative % of Total	Nominal Sieve Opening Size (mm)	Retained Sample (g) Opening (mm)
		0.000%	0.000%	3.350	0.000
18	3.570	2.378%	2.378%	1.000	3.570
20	27.180	18.106%	20.484%	0.850	23.103
25	37.82	25.193%	45.677%	0.710	26.852
30	32.3	21.52%	67.19%	0.600	19.38
35	21.85	14.56%	81.75%	0.500	10.925
40	6.410	4.270%	86.02%	0.425	2.724
45	16.700	11.124%	97.14%	0.354	5.912
50	1.030	0.686%	97.83%	0.300	0.309
60	2.520	1.679%	99.51%	0.250	0.630
70	0.090	0.060%	99.57%	0.212	0.019
80	0.040	0.027%	99.59%	0.180	0.007
120	0.000	0.000%	99.59%	0.125	0.000
*Pan	0.000	0.000%	99.59%	0.038	0.000
<b>Total</b>	<b>149.5</b>			<b>Sum =</b>	<b>93.43</b>

\* Approximated as a #400 Sieve

Average particle size (mm) = 0.62



# *Appendix 3*



Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: KTA-Tator, Inc. (1861)
Address: 115 Technology Drive
Pittsburgh, PA 15275

Order #: 340593

Matrix: Bulk
Received: 10/03/19
Reported: 10/07/19

Attn:
Project: RPS Materials Services
Location: Pittsburgh
Number: 390731

PO Number: 19PO-627

Table with columns: Sample ID, Cust. Sample ID, Location, Parameter, Method, Result, RL\*, Units, Analysis Date, Analyst. Includes Metals Analysis section with results for Mercury, Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, and Silver.

340593-10/07/19 03:39 PM

Signature of Jennifer Lee
Reviewed By: Jennifer Lee
Manager

EPA TCLP Regulatory Limits

Table with columns: Parameter, Reg. Limit, Unit. Lists limits for Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver.

All internal QC parameters were met. Unusual sample conditions, if any, are described. Surrogate Spike results designated with "D" indicate that the analyte was diluted out. "MI" indicates matrix interference. Concentration and \*Reporting Limit (RL) based on areas provided by client. Values are reported to three significant figures. Solid PPM = mg/kg | PPB = µg/kg and Water PPM = mg/L | PPB = µg/L. The test results reported relate only to the samples submitted.



**Customer:** KTA-Tator, Inc. (1861)  
**Address:** 115 Technology Drive  
Pittsburgh, PA 15275

**Order #:** 340593

**Matrix** Bulk  
**Received** 10/03/19  
**Reported** 10/07/19

**Attn:**  
**Project:** RPS Materials Services  
**Location:** Pittsburgh  
**Number:** 390731

**PO Number:** 19PO-627

Sample ID	Cust. Sample ID	Location	Result	RL*	Units	Analysis Date	Analyst
Parameter		Method					

**State Certifications**

Method	Parameter	Pennsylvania	Virginia
EPA 6010D	Arsenic	ELAP Certified	VELAP Certified
EPA 6010D	Barium	ELAP Certified	VELAP Certified
EPA 6010D	Cadmium	ELAP Certified	VELAP Certified
EPA 6010D	Chromium	ELAP Certified	VELAP Certified
EPA 6010D	Lead	ELAP Certified	VELAP Certified
EPA 6010D	Selenium	ELAP Certified	VELAP Certified
EPA 6010D	Silver	ELAP Certified	VELAP Certified
EPA 7471B	Mercury	ELAP Certified	VELAP Certified

State	Certificate Number
Pennsylvania	ELAP 014
Virginia	VELAP 10510

All internal QC parameters were met. Unusual sample conditions, if any, are described. Surrogate Spike results designated with "D" indicate that the analyte was diluted out. "MI" indicates matrix interference. Concentration and \*Reporting Limit (RL) based on areas provided by client. Values are reported to three significant figures. Solid PPM = mg/kg | PPB = µg/kg and Water PPM = mg/L | PPB = µg/L. The test results reported relate only to the samples submitted.