

Certificate of Chemical Analysis

Customer: Robertson Crushed Stone

Report #: RL20A25

Location: Milltown, IN

Test Date: December 7, 2020

Sample Identification: 3/4 Ledge, Metso Ag-Lime: December 7, 2020

Instrument Type: XRF (X-Ray Fluorescence)

Sample Type: Pressed Pellet

Serial Number: 31582- P2

Calibr. Traceability: NIST and CRM

Date of Calibration\Certification: December 1, 2020

Technician: Patrick C. Robertson

Chemical	Ag-Lime	Uncer.		Sieve #	Sieve Size	% Passing
CaCO ₃	83.56	±0.75		#8	2.36mm	99.69
MgCO ₃	10.40	±0.50		#10	2mm	99.10
SiO ₂	3.51	±0.15		#25	710u	73.23
AlO ₂	0.61	±0.15		#40	425u	57.38
Fe ₂ O ₃	0.32	±0.15		#50	300u	44.60
Other	1.60	N/A		#60	250u	40.35
TNP/NV/CCE%	96.04	±1.25				
% Passing 60-Mesh	40.35			Indiana Freeness		70.02
% Passing 8-Mesh	99.69					
RNV (Indiana)	67.24			Grams Sieved		500

Indiana: $RNV = (CCE/100) * (0.5 * ((\% \text{Passing } 60\text{mesh} + \% \text{Passing } 8\text{mesh}))$

Analysis:

The above chemical composition measurement was made, using XRF technology. The sample was irradiated with 25 to 50 KeV X-Rays focused onto Copper and RX9 targets for noise reduction. The diffraction pattern is then analyzed using enhanced energy dispersive technology.

Sampling:

The composite sample was taken in accordance with ASTM method C50. Per specifications, individual samples were collected on each day that shipments were made to the customer. These samples were combined and randomized. One third of the sample was tested, one third was sent to the customer for analysis and one third will be archived for 30 days from test date.

The sample was milled to a sub 250 micron particle size distribution (optimum size distribution for XRF measurement). It was then pressed into a pellet using a hydraulic force of 25 tons (50,000 lbs force).

Traceability:

Calibration of the XRF instrument was made using two NIST (National Institute of Standards and Technology) standards and four CRM (Certified Reference Material) standards, and 11 CRM's. The calibration calculations were empirical.

Calibration Verification:

Calibration verification is maintained using a series of seven calibrated Limestone samples covering the Calcium Carbonate range from 74 to 95 and the Magnesium Carbonate range from 1.6 to 15%.

Approval Signature: *Patrick C. Robertson*

Date: December 7, 2020

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