KNOWLEDGE BRIEF

MADE FROM MICRONIZED
PURE WHITE PUMICE

Amorphous Aluminum Silicate

A Performance Functional Filler for the Coatings Industry

Hess NCS Products: A non-crystalline silica for increased performance in coatings without the health risks of crystalline silica

Hess NCS grades are mined and refined from the world's purest commercial deposit of white pumice. Our micronized grades are non-hazardous and free of crystalline silica.

A True Functional Filler

Our NCS amorphous silica is composed primarily of aluminum silicate, and, in structure, is a naturally calcined volcanic glass foam consisting of highly vesicular strands permeated with tiny holes.

It is this distinctive, sponge-like structure that make the Hess NCS grades true functional fillers—the particles fully integrate and *mesh* into the polymer networks of various coatings. This results in a much more functionally useful, reinforced pigment than is possible with typical platey extenders such as mica and talc. Compared to typical extenders, the following improvements in coating properties have been demonstrated:

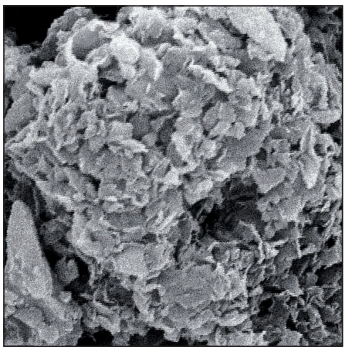
- Improved **corrosion resistance**.
- Improved **impact resistance**.
- Improved **flexibility**, **film integrity** and **overall durability**.
- Improved **grain cracking resistance** and **color retention**.

In addition, Hess NCS products provide outstanding scrub and burnish resistance due to the particle hardness (6 Mohs hardness).

The lower density of our NCS grades (.051 gal/lb) allows for a volume replacement, rather than a per pound replacement, providing a considerable cost savings.

Workplace Safety and Health Issues

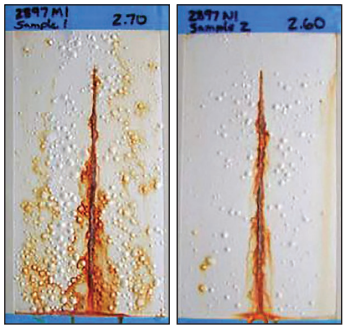
Crystalline Silica (respirable) has been identified as a "group 1" carcinogen by the International Agency for Research on Cancer (IARC). OSHA therefore requires all products containing more than .1% crystalline silica to be labeled as a cancer hazard. Our NCS products are non-hazardous, crystalline silica free to the detectable limit of .05%)



Above: A scanning electron microscope photograph showing the frothy nature of NCS pumice, even crushed to a 10-micron size particle.

Below: Salt Fog Exposure test (ASTM B117), 500 Hours Equivalent PVC, direct filler pigment replacement.

MINEX® 10 HESS NCS•3



HESS NCS GRADES

The Grade Numbers indicate the average particle size in microns.

	HEGMAN GRIND	OIL ABSORPTION
HESS **NCS•3**	8.0	44.10
HESS **NCS•5**	6.5	41.60
HESS **NCS•8**	6.0	35.90
HESS **NCS•10**	5.0	34.50
HESS **NCS•12**	4.5	34.90

CHEMICAL ANALYSIS & PROPERTIES

Chemical Name: Amorphous Aluminum Silicate

TYPICAL CHEMICAL ANALYSIS

- Silicon Dioxide - 76.2 %
- Aluminum Oxide - 13.5 %
- Ferric Oxide - 1.1%
- Ferrous Oxide - 0.1%
- Sodium Oxide - 1.6%
- Potassium Oxide - 1.8%
- Calcium Oxide - 0.8%
- Titanium Oxide - 0.2%
- Magnesium Oxide - 0.05%
- Moisture - <1.0 %

GENERAL PHYSICAL PROPERTIES

- Hardness (Mohs) - 6.0
- pH - 7.2
- Bulking Value - 19.57 lb/gal (.051 gal/lb)
- HMIS - 0
- Softening Point - 900 degrees C
- GE Brightness - 84

Have specific questions?
Contact us.

Hess NCS FUNCTIONAL FILLER

Hess Pumice Products
Post Office Box 209; 100 Hess Drive
Malad City, Idaho 83252
1.800.767.4701 x 147
salesmgr@hesspumice.com
www.hesspumice.com

EXPOSURE TESTS

EXTENDER	COLOR	GEN APP	CHALKING	CRACKING	FLAKING	DIRT	MILDEW	DARKENING	FADING
HESS NCS•8	BLUE	8.75	10.00	10.00	10.00	8.88	8.88	10.00	9.50
HESS NCS•8	WHITE	7.28	10.00	10.00	10.00	7.88	6.88	7.38	-
GRAND AVERAGE:		8.07	10.00	10.00	10.00	8.38	7.88	8.69	9.50
HESS NCS•10	BLUE	8.75	10.00	10.00	10.00	8.88	8.88	10.00	9.75
HESS NCS•10	WHITE	7.28	10.00	10.00	10.00	7.88	6.88	7.38	-
GRAND AVERAGE:		8.07	10.00	10.00	10.00	8.38	7.88	8.69	9.75
HESS NCS•12	BLUE	8.75	10.00	10.00	10.00	8.88	8.88	10.00	10.00
HESS NCS•12	WHITE	7.28	10.00	10.00	10.00	7.88	6.88	7.38	-
GRAND AVERAGE:		8.07	10.00	10.00	10.00	8.38	7.88	8.69	10.00
Minex® 4	BLUE	8.75	10.00	10.00	10.00	8.88	8.88	10.00	8.75
Minex® 4	WHITE	7.28	10.00	10.00	10.00	7.88	6.88	7.38	-
GRAND AVERAGE:		8.07	10.00	10.00	10.00	8.38	7.88	8.69	8.75
SafSil® CT200	BLUE	8.75	10.00	10.00	10.00	8.88	8.88	10.00	10.00
SafSil® CT200	WHITE	7.28	10.00	10.00	10.00	7.88	6.88	7.38	-
GRAND AVERAGE:		8.07	10.00	10.00	10.00	8.38	7.88	8.69	10.00

Averaged 38 Months Exposure | 10 = Perfect • 0 = Failure

Replacing Crystalline Silica

Our NCS products have a lower density and must replace CS— or any other filler—on a volume basis, rather than by weight. This results in higher bulking values and higher yields per pound of NCS product verses CS product.

Gloss and sheen control with NCS is, in general, equal to and usually better than CS products. Hiding power can also be improved using NCS products. Additionally, NCS products work well as a replacement for Zeospheres in coatings.

Properties for Coatings

Hegman results start at approximately 5 for the coarser grades. Oil absorption ranges between 30% to 40% depending on the grade. These products are also known for their outstanding durability & weathering properties, including no known instance of frosting or chalking after several years exposed to the elements. Hess NCS functional filler grades are also used in sheen control applications.

Applications

Applications for the Hess NCS (Non-Crystalline Silica) functional fillers include:

- Industrial Coatings
- Architectural Paints and Stains
- Epoxies
- Rubber Compounds
- Plastics/Fiberglass Compounds
- Silicones/Caulkings

Availability and Packaging

Hess NCS products are shipped world-wide packaged in palleted 50 lb/20 kg poly-lined paper bags, 1000 lb/450 kg bulk bags, and 2000 lb/900 kg bulk bags.

Request a Sample of our NCS

Call for a sample of the brightest and hardest Amorphous Aluminum Silica commercially available in the world or complete the sample request form at **www.hesspumice.com/sample-request.html**

RESEARCH: If you're exploring how pumice may fit your particular filler extender need and would like to run some tests—then we invite you to contact **Brian Jeppsen**, VP of R&D, at **208-766-4777 x111** or email: **brian@hesspumice.com**

SALES: If you want to talk availability, grades or grade blends, logistics, costs—contact **Jason Kimberling**, Sales Manager, **208-766-4777 x142** or email **salesmgr@hesspumice.com** ■

SCRUB RESISTANCE (ASTM D-523)

Based on Southern Exposures data, scrubs on the pigments tested. Higher numbers better.

PIGMENT	NUMBER OF CYCLES
Hess NCS•12	1097
Minex® 4	1021
SIL-CO-SIL®	989

FINENESS OF DISPERSION (ASTM D-1210)

	HEGMAN FINENESS OF GRIND
HESS NCS•12	5
Minex® 4	5

BURNISH

	% INCREASE
HESS NCS•12	60
Minex® 4	61

POROSITY (STAIN RESISTANCE)

	REFLECTANCE RETAINED
HESS NCS•12	100
Minex® 4	99.97

OIL ABSORPTION (ASTM D-281-95)

PIGMENT	DETERMINED VALUE
HESS NCS•12	30.8
Minex® 4	23
SIL-CO-SIL®	22

WHITENESS

These drawdowns were measured by Southern Exposures using the exact same paint formulas with the only variable being the pigment used (same volume of each pigment in each formula).

DRAWDOWN	Berger Whiteness	CIE Whiteness	ASTM E313 Yellowness
HESS NCS•12	83.13	82.57	1.55
Minex® 4	83.07	82.61	1.80
DELTA	0.5	-0.03	-0.25