

OSHA's Final Ruling on Silica

Background

In 2016, OSHA published the final rule to protect workers from exposure to crystalline silica. Crystalline silica can be found in Quartz and is a basic component in soil, sand, granite and other minerals.

The new rule is to protect more than 2 million workers in the United States that are at risk to silica exposure. The health effects of crystalline silica exposure have been linked to disabling illnesses, fatalities and have been classified as lung carcinogen. Exposure to silica can cause silicosis, which is disabling if not fatal by causing scar tissue in the lung and reduces the lungs ability to take in oxygen. High risk workers would include foundry work, stonecutting, rock drilling, quarry work, tunneling and any occupation, which can chip, cut drill or grind off crystalline silica in to respirable size fractions.

In order to minimize the health effects of silica, OSHA has established a new Permissible Exposure Limit (PEL) over an 8-hour work shift. The new rule reduced the PEL by 50%. The new PEL is 50 ug/m3. Additionally, OSHA also adopted an action level of 25 ug/m3, which is the same level as the ACGIH TLV for quartz and cristobalite.

SM-7204: Personal Real-Time Silica Monitor

Cross Calibration

Real Time Nephelometers are calibrated with a standardized test dust. Test dust varies; however, a commonly used test dust is the ISO12103-01A2 Fine Test Dust, or "Arizona Road Dust." The particle characteristics and properties of silica at site will vary from the test dust, causing a variance in the instrumentation response. To compensate for this variance Cross Calibration is required.

$$\text{Calibration Factor} = \frac{\text{Gravimetric Filter TWA}}{\text{SM4000 TWA}}$$

Traditional Cross Calibration requires two devices; a Reference Sampler and a Real-Time Nephelometer. The Reference Sampler is a pump attached to gravimetric filter. The filter is sent to the lab and compared with the post ex facto real- time readings. The SM-7204 changes the way sampling is performed and reduces the need for two instruments. The SM-7204 is a compliance monitor as it offers a 37mm filter cassette for pre-weighed filters and a flow compensated pump! The SM-7204 has a far superior design compared with other Real-Time Personal Samplers.

The SM-7204 offers a miniature optical sensor mounted in the OSHA defined breathing zone. The sensor is situated between the gravimetric filter and Respirable Cyclone. The SM-7204 is **THE ONLY** device on

HAZ-DUST Model: SM-7204 Personal Silica Monitor

Application Note: New Product DOC1216

the market with this unique feature. In addition, it allows users to name data sets and create libraries of aerosol profiles.

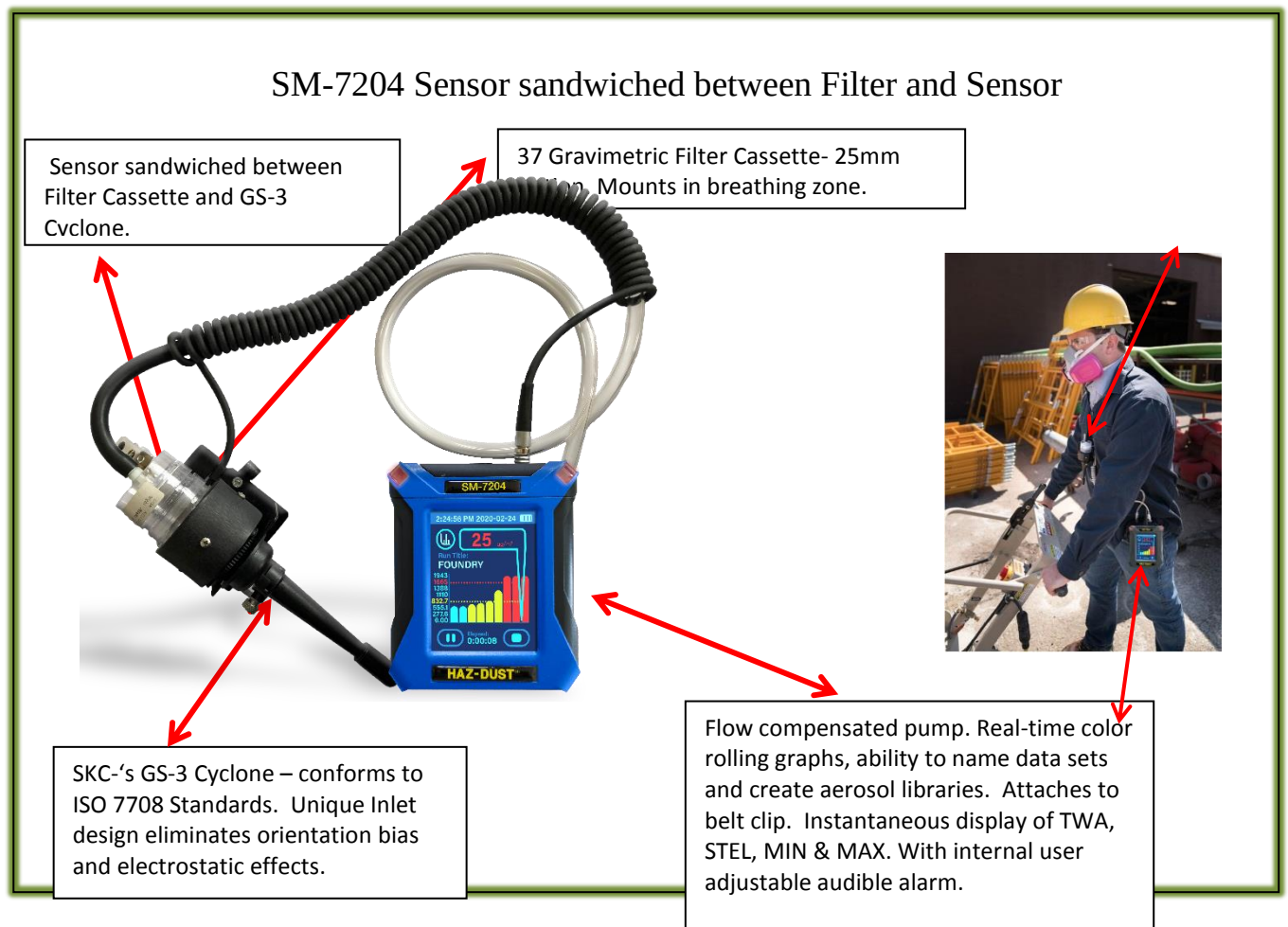
Design of the SM-7204

Unique Design – Patent Pending

Having the air sampler mounted in the breathing zone allows for a more accurate representation of workers exposure. In addition, having a Real-Time Optical Sensor placed in the breathing zone, reduces inner wall dust deposition, experienced by other Real-Time optical devices on the market.

Also having a gravimetric filter cassette directly behind the optical sensor allows for maximum particle deposition and thus a more accurate representation of worker exposure.

In addition to the Real-Time Concentration Readings, the DustComm Software allows for graphical analysis and comprehensive time history reporting.



Specifications of the SM-7204

HD-7204 Specifications Sensors

Sensor Type: 90° light scattering 880nm
Calibration: Calibrated against Gravimetric reference NIST traceable- SAE fine test dust ISO12103-1 A2 Fine Test Dust.
Accuracy: +/- 10% to filter gravimetric SAE fine test dust
Precision: +/- 0.02 mg/m3
Sensing Range: 0.001-500 mg/m3 or 1-500,000 ug/m3
PM Size Range: 0.1 to 100µm
Minimum Resolution: 1 ug/m3 (0.001 mg/m3)
Zero Stability: +/- 0.001 mg/m3 (give ug/m3 equivalent also) over 24 hours using 10 second log rate.

Recording Time

1 second to 15 days
Sampling Rate: 1 sec., 4 sec., 10 sec., and 60 sec

Data Storage

43,200 data points

Memory & Time Storage

>5 years

Digital Output

Micro USB 6.00' (1.83m), A Male to Micro B Male, 28SWG, Shielded

Display

Humidity: 95% non-condensing
3.5", 24-bit True color, Resistive Color Touch, with Auto Dimming

Real-Time Data Display

Time: Hours, min., sec., 12hour & 24 hour
Date: MM/DD/YYYY, YY/MM/DD, DD/MM/YY
Data Display: Concentrations (mg/m3, ug/m3), Sampling Size Fraction of PM (OSHA TWA, AVE., MAX., MIN.), Start time, stop time, elapsed run time, Log rate, Flow, Real-Time Rolling Graphs (10 sec and 1 second), Personalized Named Data Sets, Unique Aerosol Profiles, Language Options, Battery Life

Power Supply

Wall Mount, Multi Bald Included, Voltage Input 100~240 VAC, Voltage Output 12V, Current Output 2A, CE, UL, CB, cUL, PSE, RCM

Sampling Flow Rate

Pump Faults, Flow Rate, In Field Calibration Test, History of Data Sets
Sampling Flow Rate: 1-5 Lpm
The pump is capable to maintain flow within ±5% as follows:

Battery

Lithium Ion pack, 7.4 Volt 3350 mAh, 24.79 watts

Operating Time

22+ hours Running at 2.0LPM with IOM and no filter.

Operating & Storing Conditions

Operating Temperature: 0 to 50°C
Storage Temperature: -20 to 70°C
Operational Humidity: 0-95% Non-Condensing

Filter Cassette

37mm preloaded and weighted filter cassette
37mm 1um jeweled cassette for diesel particulates
25mm Preloaded cassette

DUSTCOMM Pro Software

Windows™ driven Windows 10 or greater

Attachable Inlets

Respirable Inlet

GS-3 Cyclone: 2.75 LPM for 4µm cut point (OSHA silica rule) Meets ISO 7708/CEN criteria

Maintenance

Zero Calibration: Before each use
In Field Calibration Verification: Before each use

Inhalable Inlet

Thoracic Inlet

Impactors

GS-1 Cyclone: 2.0LPM for 4µm cut point (OSHA silica rule) 3 LPM for 3.5 cut point (MSHA silica standard) 1.7 or 2.0 LPM with DPM cassette (MSHA DPM sampling) Meets ISO 7708/CEN criteria

IOM sampler: 2.0 LPM

Meets ISO 7708/CEN criteria

Thoracic Sampling Inlet: 2.0LPM

PM10, PM5.0, PM4.0, PM2.5

Audible & Visual

Audible: 90db at 3ft

Ceiling and S.T.E.L Alarms, Pump Fail, and Low Battery

Weight and Dimensions

Flow Calibration: Before each use. Will automatically change when switching PM selective size.

Sensor Cleaning: By user when needed/ or during annual calibration
Factory Calibration: Annually or when instrument fails infield calibration verification.

Dimensions (Case): 3.5" x 2.25" x 4.75"
Sensor Dimensions: 1.75" x 1.5"

Weight Instrument: 1.14lbs

Weight Sensor: 0.6lbs

Display dimensions: 3.5"

PM Sensor

Sensor Type: 90° light scattering 88nm
Calibrated against Gravimetric reference NIST traceable-