ANALYT MESSTECHNIK



INSTRUCTIONS FOR USE

SKC Elemental Mercury Passive Sampler

Fitting the sorbent capsule, sampling, cleaning, sampling conditions and the calculation of the result for the SKC 520 Series passive sampler for elemental mercury vapour.

AMTC-IN-0038

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About this document

These instructions cover the SKC 520 Series passive sampler for elemental mercury vapour: the reusable capsule holder 520-03 and the replaceable sorbent capsules 520-02A and 520-02C. It takes you through fitting a capsule, taking a sample, sending it to the laboratory and cleaning the holder for the next use. It also gives the conditions that affect the sampling rate and the calculation that turns the laboratory result into an airborne concentration.

Read Safety (p. 5) and Product and supplied items (p. 6) first. Then follow Before use (p. 8), Procedure (p. 9) and After use and sample handling (p. 10); the last also covers cleaning the housing. Sampling conditions (p. 7) helps you decide whether a passive sample suits your workplace; Analysis and results (p. 10) is for you and your laboratory. The sampler is validated in OSHA Method ID-140 and evaluated in HSE MDHS 16/2; the method you work to sets the details, and these instructions do not replace it.

Keep these instructions for the lifetime of the product. The current revision is on the product page at analyt-mtc.com.

How these instructions mark information

NOTICE

Practices not related to personal injury — damage to the product, the process or the sample.

Note
Information that helps understanding; never a hazard.

Tip
A shortcut or recommendation; never a hazard.

Document information

Title	SKC Elemental Mercury Passive Sampler — Instructions for use
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Revision history

Rev.	Date	Change
2	October 2026	Quality programme: new document type, number and identity pages.
1	October 2026	First issue.

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Contents

1 **Safety** 5
- Intended use 5
- Protecting the sample 5

2 **Product and supplied items** 6
- What the sampler measures 6
- Parts of the sampler 6
- Sampling conditions 7

3 **Before use** 8
- Fit a capsule 8
- Handling rules 8

4 **Procedure** 9
- Take the sample 9

5 **After use and sample handling** 10
- After sampling 10
- Clean the housing 10
- Analysis and results 10
  - Notes for the laboratory 10
  - Calculating the concentration 11
- Disposal 11

6 **Specifications** 12

7 **Ordering information** 13
- Ordering information 13

8 **Service and contacts** 14

CHAPTER 1

Safety

Read this chapter before you use the sampler. Its safety messages are repeated where they apply in the chapters that follow.

Intended use

The SKC 520 Series passive sampler measures elemental mercury vapour in air: worn in the breathing zone for a personal sample, or set up in a fixed place for an area sample. It does not collect organic mercury compounds or mercury in particulate matter. The housing is reusable once it has been cleaned as described in Clean the housing (p. 10); each sorbent capsule is used once.

Protecting the sample

NOTICE

A capsule that picks up mercury before sampling contaminates the sample, and the protective cap does not seal a fitted capsule airtight. Close the vial with the remaining capsules again and keep it in a safe place where it cannot pick up mercury. Use a fitted capsule within a few days.

NOTICE

Mercuric chloride can deposit on the face of the badge and interfere with the sample. Take care where mercuric chloride is present.

NOTICE

A source of mercury near the bagged sample can contaminate it. Store the bagged sample away from any source of mercury until it reaches the laboratory.

CHAPTER 2

Product and supplied items

The SKC 520 Series passive sampler is a light, reusable badge that measures a person's exposure to elemental mercury vapour. It is worn in the breathing zone, or set up in a fixed place for area sampling, and needs no pump.

Mercury vapour reaches the sorbent by controlled diffusion through a diffusive barrier, so the sampler takes up a known volume of air per minute. The sorbent sits in a replaceable capsule inside a reusable housing. After sampling, the laboratory dissolves the sorbent and measures the mercury by flameless (cold vapour) atomic absorption. The housing is cleaned and used again with a new capsule.

What the sampler measures

Note

Elemental mercury vapour only. The sampler collects elemental mercury (Hg) in the vapour phase. It does not collect organic mercury compounds or mercury in particulate matter.

NOTICE

Mercuric chloride can deposit on the face of the badge and interfere with the sample. Take care where mercuric chloride is present.

Tip

For low mercury levels, sample with a sorbent tube and a pump instead of the passive sampler.

Parts of the sampler

The housing carries a collar clip. From front to back, the diffusive barrier, two mesh screens and a retainer ring stay in the housing; the sorbent capsule goes in behind them, with its mesh side facing the diffusive barrier, and the back cap with a foam disc closes the housing. The protective cap covers the front between samples.

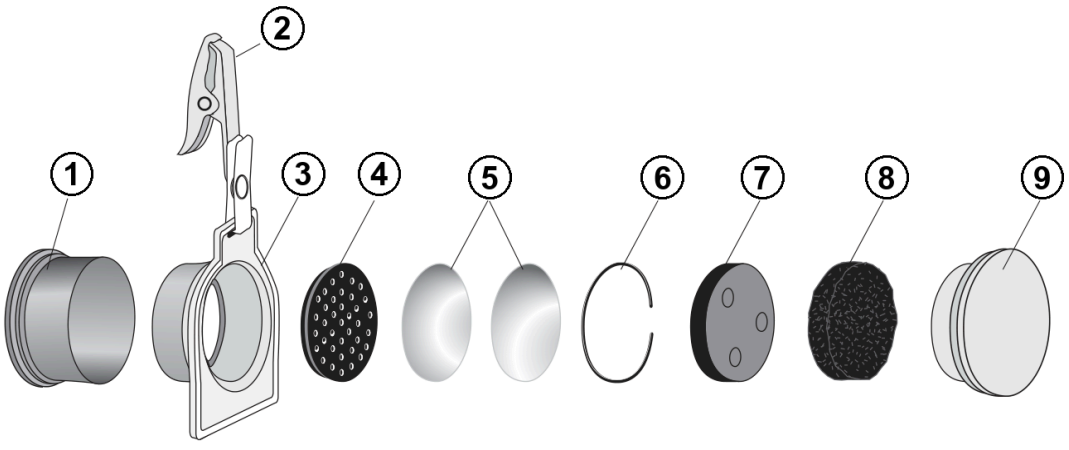


Figure 2-1. Exploded view of the sampler. (1) Protective cap. (2) Collar clip. (3) Reusable housing. (4) Diffusive barrier. (5) Mesh screens, two. (6) Retainer ring. (7) Sorbent capsule 520-02, mesh side towards the diffusive barrier. (8) Foam disc. (9) Back cap.

Sampling conditions

A passive sampler collects mercury at a rate set by diffusion, and diffusion depends on the air around the badge. Temperature and pressure are corrected in the calculation; air movement is not, so check it before you choose a passive sample.

Condition	Effect on the sample
Temperature	The diffusion coefficient D rises with the absolute temperature T, as D ∝ $T^{1.5}$. The effect is small but can matter at unusually high or low temperatures. The calculation in Calculating the concentration (p. 11) corrects for it.
Air pressure	The diffusion coefficient is inversely proportional to the ambient pressure. The same calculation corrects for it.
Air velocity	The sampling rate stays substantially constant between 25 and 750 ft/min. In very still air, below 25 ft/min, it falls by up to 30 %.
Other gases	Other gases, chlorine included, have been shown not to affect the uptake of mercury on the sorbent. Complex reactions in the atmosphere may, however, reduce the amount of free elemental mercury available to be sampled.

Note

No passive sampling in strong air flow. Where air velocities above 750 ft/min are expected, do not use passive samplers.

CHAPTER 3

Before use

Work in a clean area, away from any source of mercury, whenever you open the sampler: to fit a capsule, to take it out after sampling and to clean the housing. The part numbers in brackets refer to Figure 2-1 (p. 6).

Fit a capsule

NOTICE

A capsule that picks up mercury before sampling contaminates the sample, and the protective cap does not seal a fitted capsule airtight. Close the vial with the remaining capsules again and keep it in a safe place where it cannot pick up mercury. Use a fitted capsule within a few days.

1. Prise the back cap (9) off the housing with a screwdriver or a coin.
2. Check that both mesh screens (5) are in the housing. Take a sorbent capsule (7) out of its plastic vial and place it in the housing with the mesh side facing the diffusive barrier (4).
3. Check that there is a foam disc (8) in the back cap, then press the back cap onto the housing.
4. Write the sample ID, the date and the start time on an ID label and stick it on the back cap. The labels come with the replacement capsules. Note any other information that matters for the sample.

Handling rules

- Check the expiry date on the packaging before you fit a capsule.
- Keep both mesh screens in the housing at all times, also when you change the capsule. They keep the sampling rate reproducible under all environmental conditions.
- Use a capsule within a few days of taking it out of the vial and fitting it in the housing.
- Fit a clean foam disc in the back cap each time you have cleaned the housing.
- Store an exposed capsule in its resealable bag.
- Never store any part of the sampler where it may be contaminated with mercury.

CHAPTER 4

Procedure

Take the sample

The recommended sampling time is 8 hours.

> **Note**
> **Do not shake the sampler.** Avoid excessive agitation of the sampler during and after sampling.

1. For a personal sample, clip the sampler to the wearer's clothing near the breathing zone. For an area sample, place it where you want to measure.
2. Take off the protective cap (1) to start the sample.
3. Keep the cap in a clean place.
4. Put the protective cap back on at the end of the sampling period.
5. Write the finish time on the ID label, with any other relevant information.

CHAPTER 5

After use and sample handling

After sampling

1. As soon as possible, take the sampler to a clean area. Pull off the back cap and take out the sorbent capsule. Remove the foam disc from the back cap and dispose of it properly.
2. Put the capsule in the resealable bag supplied with it. Move the ID label from the back cap to the bag.

   NOTICE

   A source of mercury near the bagged sample can contaminate it. Store the bagged sample away from any source of mercury until it reaches the laboratory.

3. Send or take the capsule, with at least one field blank, to a qualified laboratory. The sorbent should be analysed within 30 days of sampling.

Clean the housing

Clean the housing after every sample, before you use it again, so that no mercury carries over to the next sample.

1. Unsnap the collar clip (2) and wash it with soap or detergent and water.
2. Take the sampler apart. Put all parts except the foam disc, the sorbent capsule and the collar clip in a container and wash them in dilute nitric acid, about 15 % in distilled water.
3. Rinse the parts three times, each time in fresh distilled water.
4. Dry the parts as quickly as possible.
5. Reassemble the housing as in Figure 2-1 (p. 6), but without a sorbent capsule or foam disc.
6. Store the housing in a clean area, where it cannot pick up mercury, until the next use.

Analysis and results

The analysis follows OSHA Method ID-140 and HSE MDHS 16/2; consult them for the full analytical procedure. The points below are the ones specific to this sampler. Pass them on to your laboratory with the samples.

Notes for the laboratory

Sample preparation

1. Open the sorbent capsule and pour the sorbent carefully into a 50 mL volumetric flask.
2. Add 2.5 mL of concentrated nitric acid, then 2.5 mL of concentrated hydrochloric acid.
3. Swirl gently from time to time for about 1 hour.
4. Make up to 50 mL with about 45 mL of distilled water.
5. Dissolved Anasorb C300 leaves a milky suspension of insoluble residue. Remove it by filtration or centrifugation before the analysis.

6. Analyse aliquots of the solution by cold vapour atomic absorption at 253.7 nm.

Blanks. Dissolve several fresh, unexposed capsules of the same lot as the samples in the same way. Their mercury content is the background of the sorbent; subtract it from all readings.

Release of the mercury. An excess of stannous chloride added to the aliquot releases the mercury in elemental form; a stream of air or nitrogen carries it into the analyser.

Calibration

- Calibrate the complete analytical system by injecting aliquots of standard solutions: liquid standards, sorbent-solution standards, or both.
- Check at least three concentrations to confirm that the response is linear over the expected range.
- Run standards and blanks between the samples to catch any drift in response.
- Mercury that builds up on the internal surfaces of the equipment raises the readings; it shows as a gradual apparent rise of the blank values. If you see it, run several aliquots of mercury-free solution until the analyser reads zero, and test the blank again before you go on.
- Report each result as nanograms or micrograms of mercury on the capsule, by direct comparison with the standards and with the aliquot size related to the total 50 mL of solution.

Calculating the concentration

The laboratory reports the total mass of mercury on the capsule in nanograms (10^{-9} g) or micrograms (10^{-6} g). This is the calculation given in OSHA ID-140 (revised June 1991), page 11.

1. Convert the reported mass of mercury to micrograms.
2. Convert the sampling period to minutes.
3. Calculate the sample volume: $V\ (L) = t\ (min) \times 0.020\ L/min \times (T_1 / T_2)^{1.5} \times (P_2 / P_1)$
4. Calculate the mercury concentration: $C\ (mg/m^3) = (m - m_{blank})\ (\mu g) / V\ (L)$

Symbol	Meaning
V	sample volume, in litres
t	sampling period, in minutes
0.020 L/min	sampling rate at 20 °C and 760 torr
$(T_1/T_2)^{1.5} \times (P_2/P_1)$	temperature and pressure correction factor
T_1	temperature at the sampling site, in kelvin
T_2	293 K (20 °C)
P_1	pressure at the sampling site, in the same unit as P_2
P_2	760 torr
m, m_{blank}	mercury mass on the sample capsule and on the blank, in micrograms
C	airborne concentration of mercury, in mg/m³

Disposal

Dispose of used samplers and their packaging under local regulations.

CHAPTER 6

Specifications

Sorbent	Anasorb C300, an SKC sorbent equivalent to Hydrar and Carulite
Sampling rate	0.020 L/min (20 mL/min) at 20 °C and 760 torr; for other conditions see Calculating the concentration (p. 11)
Capacity	more than 30 µg mercury per capsule
Breakthrough volume	more than 1500 L of air
Limit of detection*	0.01 µg
Limit of quantitation*	0.04 µg
Overall coefficient of variation	6.1 %
Recommended sampling time	8 hours
Analysis	flameless (cold vapour) atomic absorption at 253.7 nm, within 30 days of sampling
Shelf life of the capsules	see the expiry date on the packaging

Performance values as evaluated by the UK Health and Safety Executive (HSE) and reported in MDHS 16/2. * The limits depend on the analysis and the instruments used.

CHAPTER 7

Ordering information

Order from Analyt-MTC with the order codes.

Replacement capsules contain Anasorb C300 and come with replacement foam discs, resealable bags and ID labels.

Ordering information

Description	Pack	Order code
Replacement sorbent capsules, Anasorb C300	10	520-02A
Replacement sorbent capsules, Anasorb C300	30	520-02C
Reusable capsule holder	1	520-03
Reusable capsule holder	5	520-03A
Stand for indoor sampling	1	690-302
Shelter for outdoor sampling	1	690-303

CHAPTER 8

Service and contacts

Contact and support

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Before you call

Have the following at hand so Analyt-MTC can help you quickly:

- the catalogue numbers of the holder and the capsules;
- the lot number and expiry date on the capsule packaging;
- the method you sample to and the sampling conditions.

Contact Analyt-MTC for capsules, spare parts, technical questions and warranty matters concerning your SKC elemental mercury passive sampler. Warranty is handled under Analyt-MTC's terms of sale. Analyt-MTC's contact details are in this chapter and on the back cover.

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