ANALYT MESSTECHNIK



INSTRUCTIONS FOR USE

SKC DPM Cassette with Impactor 225-317

Parts, sampling train with or without the GS-1 cyclone, flow rate verification, sampling and ordering for the SKC DPM cassette with impactor 225-317, for diesel particulate matter.

AMTC-IN-0015

About this document

These instructions cover the SKC DPM cassette with impactor 225-317, a single-use sampler for diesel particulate matter (DPM) and for carbon nanotubes and nanofibres. It also applies to version 225-317-SB, which has security bands around the end plugs. These instructions name the parts of the cassette, then takes you through the sampling train with or without a GS-1 cyclone, flow rate verification, sampling and dispatch to the laboratory.

Start with the chapters Safety (p. 4) and Product and supplied items (p. 5), then follow Before use (p. 6) (which includes Flow-rate verification (p. 7)), Take the sample (p. 9) and Shipping and analysis (p. 10) in order; Ordering information (p. 12) lists the part numbers. The sampling method you work to, for example NIOSH Method 5040, sets the flow rate, the sampling time and the analysis; these instructions do not replace it, nor the instructions of your pump and flowmeter.

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

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Manufacturer	SKC Inc.

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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CHAPTER 1

Safety

Read this chapter before you use the cassette. It states what the cassette is intended for and brings together the safety messages of these instructions.

Intended use

The SKC DPM cassette with impactor, 225-317, separates submicron particles, such as diesel particulate matter, carbon nanotubes and carbon nanofibres, from coarser respirable dust and collects them on a quartz filter. The cassette is for single use. Use it with a sample pump at the flow rate your sampling method sets, and with a cyclone such as the GS-1 wherever larger particles are likely to clog the impactor (see Before use (p. 6)).

Safety messages

The messages in these instructions protect the sample. Each one is repeated at the step it concerns, in Before use (p. 6), Flow-rate verification (p. 7) and Take the sample (p. 9).

NOTICE

Larger particles can clog the impactor of the cassette. A cyclone is not needed in every sampling situation, but use one wherever such particles are likely.

NOTICE

Removing the grit pot changes the air path through the cyclone. The flow-rate verification and the sample are then invalid. Keep the grit pot on the cyclone body during flow-rate verification and during sampling.

NOTICE

An open cassette can pick up contaminants or lose part of the sample. Close both ports immediately after sampling.

CHAPTER 2

Product and supplied items

The DPM cassette separates submicron particles, such as diesel particulate matter, carbon nanotubes (CNTs) and carbon nanofibres (CNFs), from coarser respirable dust such as coal dust, and collects them on a quartz filter.

Air enters at the inlet (8) in the cassette body (7). The impactor assembly (6) has four nozzles with precision sapphire orifices; it takes out respirable particles of 1.0 µm and larger on its impaction substrate. Particles smaller than 1.0 µm pass on and are collected on the first quartz filter (4). The stainless steel ring (5) defines the filter area.

The second quartz filter, behind the first, is a dynamic blank: the laboratory uses it to correct the result for absorbed organic carbon. The support pad (3) carries the filters; the air leaves through the outlet (2) to the pump.

The cassette is made of plastic and used once. It comes assembled and tamper-evident sealed, which protects the integrity of the sample. Plugs (1, 9) close the outlet and the inlet until you sample.

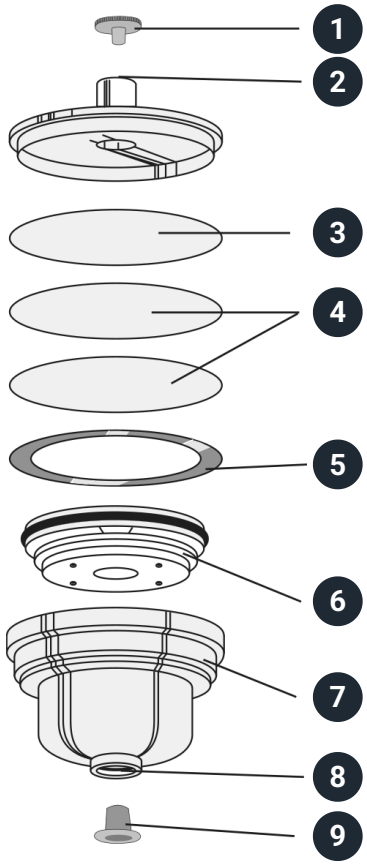


Figure 2-1. DPM cassette 225-317, exploded. (1) Plug. (2) Outlet. (3) Support pad. (4) Two heat-treated, binder-free quartz filters. (5) Stainless steel ring, defines the filter area. (6) Impactor assembly. (7) Cassette body. (8) Inlet. (9) Plug.

CHAPTER 3

Before use

What you need

- a sample pump that holds the flow rate your method specifies;
- a flowmeter, and a calibration jar or the jarless set-up, to verify the flow rate;
- with a cyclone: an SKC GS-1 cyclone 225-105, which removes the non-respirable particles before they reach the cassette, and the filter cassette/cyclone holder 225-1, which is required to hold the cassette on the GS-1 cyclone;
- without a cyclone: tubing, a cable tie and a collar clip, for example the set 225-13-8 (1/4 in tubing).

The cassette has a limited shelf life; see Specifications (p. 11).

NOTICE

Larger particles can clog the impactor of the cassette. A cyclone is not needed in every sampling situation, but use one wherever such particles are likely.

Note

Keep the plugs you take off the cassette: you need them to close it after sampling.

Verify the flow rate first, with a representative cassette (see Flow-rate verification (p. 7)). Then set up the sampling train as below with a fresh, unused cassette.

With the GS-1 cyclone and holder

1. Push the stem of the GS-1 cyclone (6) into the large hole of the cassette holder (4).
2. Turn the cyclone in the holder until the small round nodule on the rim of the bowl adapter sits in the notch of the holder.
3. Take the inlet and outlet plugs out of a DPM cassette (3).
4. Pull back the spring-loaded hold-down plate (2) of the holder and push the cassette inlet gently onto the top of the cyclone.
5. Release the plate so that its small hole sits over the cassette outlet.
6. Push the Luer adapter on the rubber tubing of the holder (1) into the cassette outlet.
7. Connect the tubing of the holder (8) to the inlet of the sample pump.

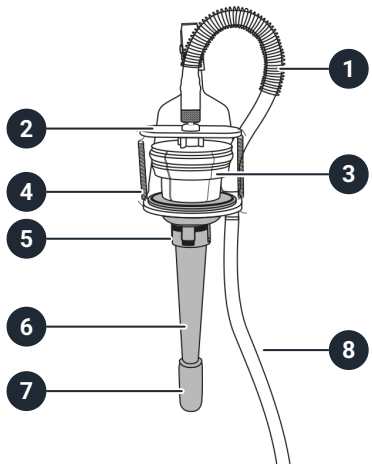


Figure 3-1. Sampling train with the GS-1 cyclone. (1) Rubber tubing with Luer adapter, in the cassette outlet. (2) Hold-down plate, spring-loaded. (3) DPM cassette. (4) Cassette holder 225-1. (5) Bowl adapter. (6) GS-1 cyclone. (7) Grit pot. (8) Tubing to the pump.

Without a cyclone

1. Take the plug out of the cassette outlet (2 in Figure 2-1 (p. 5)). Leave the inlet plug in.
2. Connect a length of Tygon tubing from the cassette outlet to the inlet of a sample pump that can hold the flow rate you need.
3. Fasten the cassette to the worker's clothing with the cable tie and collar clip.
4. Take the plug out of the cassette inlet just before you start sampling.

Flow-rate verification

Verify the flow rate through the complete sampling train before sampling, with a representative DPM cassette that you then replace with a fresh one. Put the cassette, or the cyclone with the cassette, in a calibration jar; with an SKC chek-mate flowmeter you can work without the jar (see Jarless method (p. 8)). The cassette is verified at 1.7 and 2 L/min; use the flow rate your method specifies.

NOTICE

Removing the grit pot changes the air path through the cyclone. The flow-rate verification and the sample are then invalid. Keep the grit pot on the cyclone body during flow-rate verification and during sampling.

Tip

Verify without the cassette holder. Use the smallest calibration jar possible. For that reason, do not put the cassette holder 225-1 in the jar: verify with the cassette, or the cyclone and cassette, alone.

With a calibration jar

1. Prepare a DPM cassette, or a cyclone with a DPM cassette on it, as a representative sampler. With a cyclone, keep the grit pot on.
2. Place it in an airtight calibration jar with an inlet and an outlet, for example the multi-purpose calibration jar 225-111 (Figure 3-2 (p. 8)).
3. Connect the flowmeter outlet to the jar inlet with flexible tubing.
4. Connect the cassette outlet to the pump inlet through the jar outlet. In the jar 225-111, push the Luer adapter inside the jar into the cassette outlet, then connect the jar outlet to the pump inlet.
5. Switch the pump on and verify the flow rate through the sampling train at the rate you need, as the instructions of your pump and flowmeter describe.
6. When the flow rate is right, open the jar and take out the cassette or the cyclone assembly. Replace the cassette you used for the verification with a fresh, unused cassette for sampling.

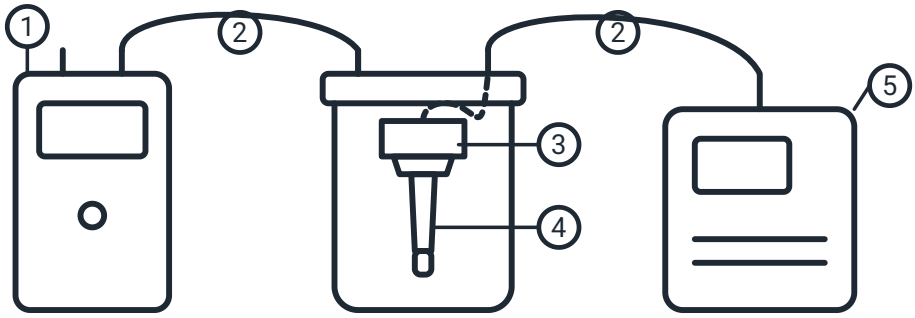


Figure 3-2. Flow rate verification with a calibration jar. (1) Flowmeter. (2) Flexible tubing. (3) DPM cassette, its outlet connected to the jar outlet by the Luer adapter inside the jar. (4) Cyclone with grit pot, without the cassette holder. (5) Sample pump.

Jarless method (SKC chek-mate flowmeter only)

Use this method when the cyclone has no calibration adapter.

1. Connect the sample pump to the outlet (suction port) of the chek-mate, with the pulsation dampener 375-100 in line between the pump and the flowmeter.
2. Connect the sampler (the cyclone with the DPM cassette, or the cassette alone) to the chek-mate inlet, with the shortest length of tubing possible (Figure 3-3 (p. 8)).
3. Verify the flow rate as in steps 5 and 6 above, following the instructions of your pump.



Figure 3-3. Jarless verification: cyclone with DPM cassette on the chek-mate inlet; pulsation dampener (black cylinder) between the chek-mate and the pump.

CHAPTER 4

Procedure

Take the sample

1. Check that the flow rate through the sampling train has been verified at the rate your method specifies (see With a calibration jar (p. 7)).
2. Switch the pump on and sample for the time your method specifies.
3. At the end, switch the pump off.
4. Take the cassette, or the cyclone with the cassette, out of the holder.
5. If you used the cyclone, pull the cassette off it.

   NOTICE

   An open cassette can pick up contaminants or lose part of the sample. Close both ports immediately after sampling.

6. Close the cassette inlet and outlet straight away with the plugs supplied.

CHAPTER 5

After use and sample handling

Shipping and analysis

Pack the plugged cassettes and send them to a laboratory for analysis. The laboratory determines the total carbon content of the sample, organic and elemental, quantitatively by NIOSH Method 5040; total carbon makes up more than 80 % of DPM particulate emissions. Carbon nanotubes and nanofibres are analysed by electron microscopy, see NIOSH CIB 65. The second quartz filter in the cassette serves as the dynamic blank.

Disposal

Dispose of used cassettes and their packaging under local regulations.

CHAPTER 6

Specifications

Performance profile

Cassette size	37 mm
Filters	Two heat-treated, binder-free quartz fibre filters, with a cellulose support pad
Filter collection area	8.04 cm²
Impactor	Four nozzles, precision sapphire orifices; removes particles ≥ 1.0 µm
Flow rate	Verified at 1.7 and 2 L/min for submicron particles
Analysis	Organic and elemental carbon by evolved gas analysis (EGA) with a thermal-optical analyser, NIOSH Method 5040; carbon nanotubes and nanofibres by electron microscopy, see NIOSH CIB 65
Use	Single use; tamper-evident sealed; meets the NIOSH 5040 specifications; limited shelf life

CHAPTER 7

Ordering information

Order from Analyt-MTC with the order codes.

Order numbers

Item	Pack	Order code
SKC DPM cassette with impactor: two 37 mm heat-treated, binder-free quartz filters; tamper-evident sealed; single use; meets the NIOSH 5040 specifications; average deposition area 8.04 cm²; limited shelf life	10	225-317
SKC DPM cassette with impactor and security bands: as 225-317, with security bands around the end plugs	10	225-317-SB
SKC GS-1 cyclone: single inlet, 10 mm, conductive plastic	—	225-105
Filter cassette/cyclone holder: holds a DPM or standard filter cassette on the worker's clothing in the breathing zone, with or without a cyclone; required for the DPM cassette with the GS-1 cyclone; takes 1/4 in inside-diameter tubing	—	225-1
Tubing, collar clip and cable tie: 3 ft of Tygon tubing, 1/4 in inside diameter, and an alligator clip on a nylon cable tie	—	225-13-8
Multi-purpose calibration jar	—	225-111
Pulsation dampener, for the jarless method with the chek-mate	—	375-100

SKC also supplies preloaded quartz filters for DPM without an impactor (225-401). Ask Analyt-MTC about them, and about the shelf life of the DPM cassettes, when you order.

CHAPTER 8

Service and contacts

Contact and support

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Before you call

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

- the part number of the cassette (225-317 or 225-317-SB) or of the part you need;
- whether you sample with or without a cyclone, and which pump and flowmeter you use;
- the sampling method you are working to.

Contact Analyt-MTC for cassettes, accessories, technical questions and warranty matters concerning your SKC DPM cassettes. Warranty is handled under Analyt-MTC's terms of sale. Analyt-MTC's contact details are above and on the back cover.

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