



ELPI+™ Accessory

SINTERED COLLECTION PLATES – N1369

Introduction

In impactor measurements particle bounce and blow-off are common problems especially with hard, solid particles. These phenomena can cause changes in the impactor calibration values and thus cause erroneous result. A recommended load on an ELPI+™ impactor stage is 1 mg, which can cause problems when sampling from high particle concentrations.

Solution

Sintered collection plates are designed to prevent common problems in impactor measurements: impactor overloading and particle bounce. Instead of collecting the particles on a smooth aluminium foil the collection area is vacuum oil embedded porous metal. When the particles are collected on the plates the oils seeps up due to capillary forces and thus the impaction always occurs on a liquid surface effectively eliminating bouncing (Figure 1).

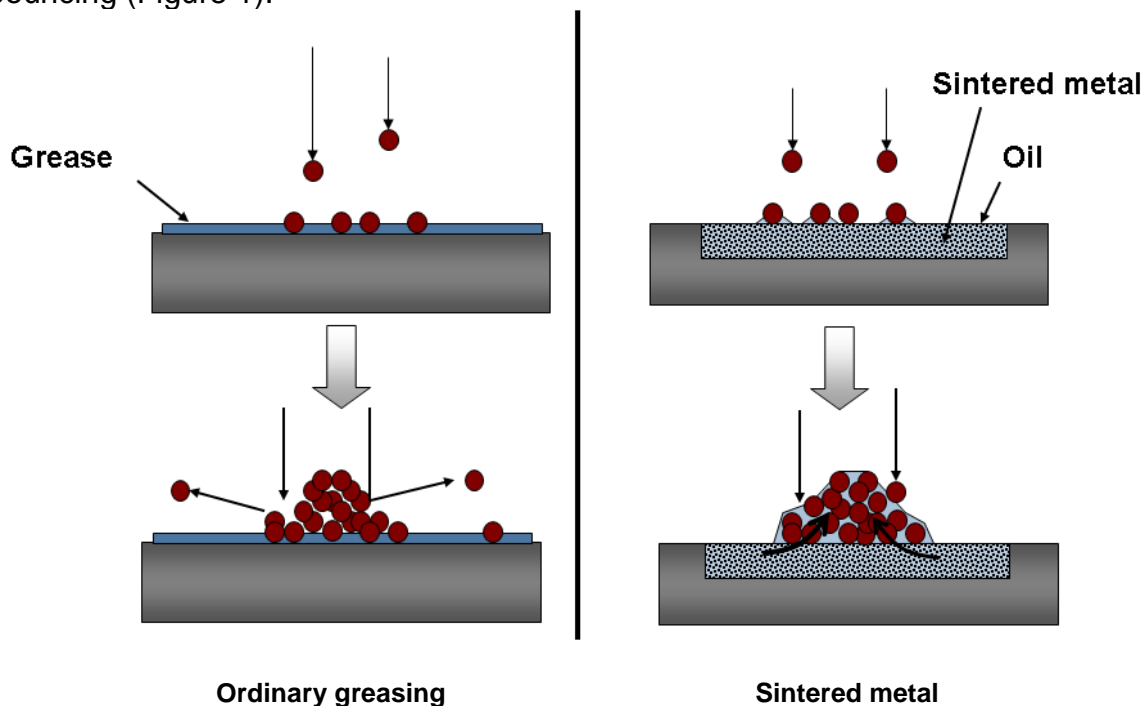


Figure 1. Operation principle of sintered collection plates.

The sintered collection plates are specially designed for measurements where the particles are particularly bouncy, such as salt or diesel soot after removal of volatile hydrocarbons. The use of sintered collection plates allows the user to collect up to 10 or 20 times more particle material when compared to normal collection plates without affecting the measured data.

Use of the sintered collection plates

Before the use of sintered collection plates vacuum oil must be added on them. Dekati Ltd recommends that the oil should be the same oil that comes with the LEYBOLD pumps, i.e. SOGEVAC GS 32 or GS 77 oil. An estimate of the amount of oil needed on each plate is 10–100 μl , i.e. 1-2 drops. The needed amount depends for example on how the plates are washed. In the first time the amount of oil can be a bit bigger as the plates can absorb more oil in.

The sintered collection plates should be cleaned in the same way as all the other parts of the impactor, with isopropanol + distilled water solution in an ultrasonic cleaner. The time needed for the cleaning in an ultrasonic bath can be a little longer than with the other impactor parts. Sintered plates should be cleaned separately from the other impactor parts.

Change in D50-values

The use the sintered collection plates changes the impactor calibration values slightly and the impactor D50% values must be recalculated. The correct values are provided with the plates. The cut points of the stages differ 1–30% from the original values.



Figure 3. Set of sintered collection plates for ELPI+™.

References

Marjamäki, M. & Keskinen, J. 2004. Estimation on the cutpoint of an impactor with porous substrates. Technical Note. Journal of Aerosol Science, vol 35, pp 657-663.

van Gulijk, C., Marijnissen, J., Makkee, M. & Moulijn, J. 2003. Oil-soaked sintered impactors for the ELPI in diesel particulate measurements. Journal of Aerosol science, vol 32, pp. 635-640.

For more information please contact Dekati Ltd.