

Annex B (informative)

Examples of particle deposition rate measurements

B.1 Example of particle deposition rate measurements at a critical location

A glass witness plate with a collection surface area of 64 cm² was selected as a test surface and exposed for 4 h at a cleanroom location that is adjacent to a vulnerable surface (critical location). For diagnostic reasons, the following particle sizes were measured: ≥10 µm, ≥20 µm, ≥50 µm, ≥100 µm, ≥200 µm and ≥500 µm.

The initial surface cleanliness of the witness plate was measured prior to exposure, i.e. background count, and is given in [Table B.1](#). [Table B.1](#) also gives the particle counts measured on the witness plate after exposure for 4 h. By deducting the background count from the count after 4 h, the number of airborne particles that deposit on the witness plate over 4 h is obtained.

Table B.1 — Determination of particle deposition rate and particle deposition rate level

Particle size	≥10 µm	≥20 µm	≥50 µm	≥100 µm	≥200 µm	≥500 µm
Initial count on 64 cm ² witness plate	3	1	0	0	0	0
Count on witness plate after 4 h of exposure	16	13	5	2	1	0
Number deposited on 64 cm ² in 4 h	13	12	5	2	1	0
R (particles ≥ D µm per m ² per hour)	508	469	195	78	39	0
Particle deposition rate level from Table 1	1 000	1 000	1 000	1 000	1 000	0
$L = R_D D/10$ (calculated)	508	938	977	781	781	0

The particle deposition rate (number per m² per hour) for each considered cumulative particle size is then calculated by [Formula \(1\)](#). The particle deposition rate level is then determined by comparing the particle deposition rate values of each particle size with the particle deposition rate levels given in [Table 1](#). The highest value is the particle deposition rate level value. In this example, a L of 1 000 is obtained for the cumulative particle sizes of ≥10 µm, ≥20 µm, ≥50 µm, ≥100 µm and ≥200 µm.

Alternatively, the particle deposition rate level can be calculated for each particle size by [Formula \(3\)](#), which is $R_D D/10$. The highest value (977) can then be compared to the L values in [Table 1](#), to obtain a L of 1 000.

B.2 Examples of monitoring the particle deposition rate at a critical location

From the risk assessment, a critical location in a cleanroom can be specified as well as the target particle deposition rate, or alert and action levels of the required particle deposition rate or particle deposition rate level. If the R_D exceeds the target or action values, then appropriate control measures can be taken to reduce the R_D .

As an example, during every working day, the particle deposition rate during 4 h is measured on a 50 cm² witness plate. For each measurement, the number of particles ≥10 µm per m² per hour is calculated.

[Figure B.1](#) shows an example of the average weekly particle deposition rate for particles ≥10 µm over a period of 20 weeks. The particle deposition rate is taken from the daily measurement over 4 h at a

vulnerable location in a cleanroom. In this example, an alert level is set at $1\,750 \geq 10 \mu\text{m}$ per m^2 per hour to prevent exceeding the required PDRL of $2\,000 \geq 10 \mu\text{m}$ per m^2 per hour. In this example, this is also the action limit.

The action limit was not exceeded during monitoring and no risk reduction measures of the type given in [Annex E](#) needed to be applied. The alert level is set at $1\,750 \geq 10 \mu\text{m}$ per m^2 per hour to give an alert when the PDRL is approaching the action value. This alert level was exceeded twice, and on each occasion an increased surveillance of the particle deposition rate results was initiated.

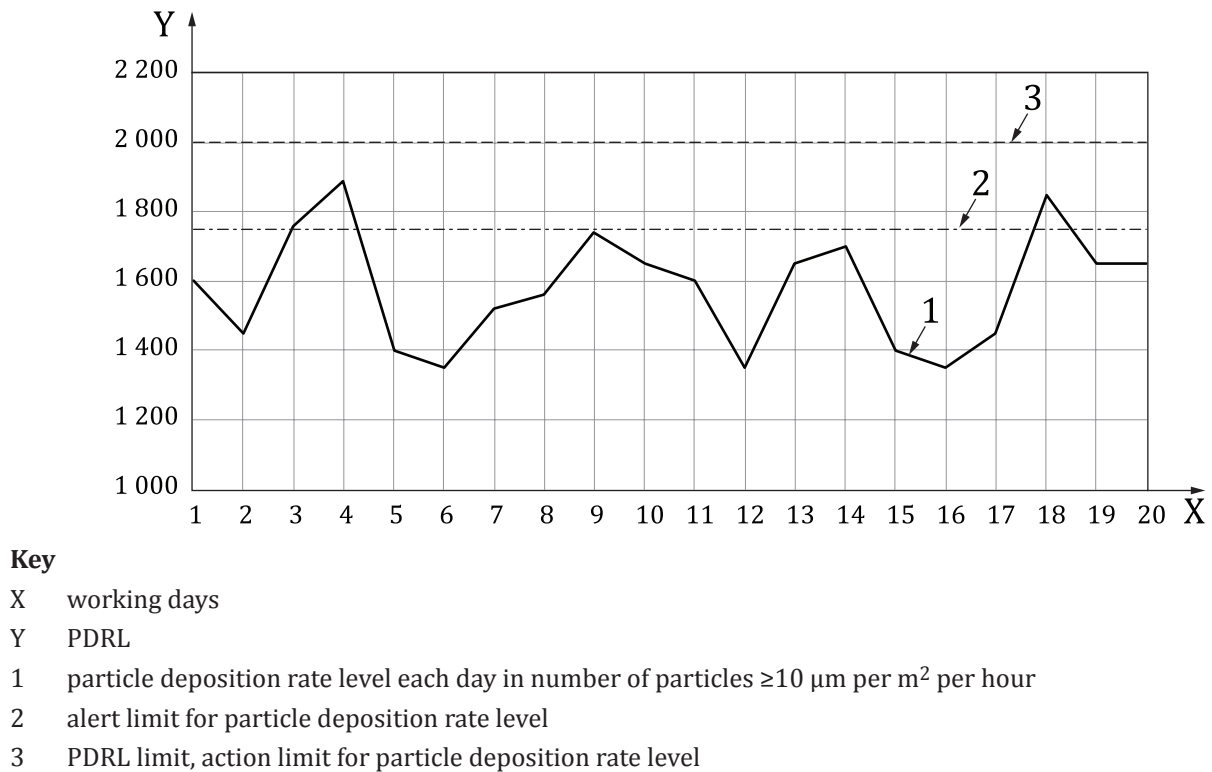


Figure B.1 — Example of daily monitoring of particle deposition rate level by a witness plate method

Measurement instruments that can measure particle deposition rate at short intervals are available (real time monitoring). As an example, a sensor with a test surface of 50 cm^2 and a sampling time of 5 min is used. [Figure B.2](#) shows an example of an operational sampling period of 72 h. It can be seen that the cleanroom is only used during daytime. This means that the actual operational time of the instrument is about 36 h. If required, the time that deposition events occur can be correlated with activities that occur in the cleanroom to identify potential sources of contamination.