



ASSESSMENT OF SOLID AEROSOL EXPOSURE

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Abstract:

The paper is focused on solid aerosols and assessment of their exposure. It describes individual parts of assessment (from identification of potential exposure to concluding). At the end of paper there are described the results of assessment as three possible enclosures. Evaluate exposure of solid aerosol and comparison with limit values is one of the reasons why to do this. In the paper there are noticed other reasons why to do this action.

Keywords:

Exposure, solid aerosol, working environment.

1 INTRODUCTION

Generally, any activity which involves burning of materials or any dust generating activities are sources of solid aerosols. Most of them, you cannot even see. They are a kind of air pollution. In fact, it may be the air pollutant that most commonly affects people's health. People are exposed to a variety of potentially harmful agents in the air that they have to breathe.

Solid aerosols are very important chemical factor in working environment. It is important to know impacts of this factor to human health. This impact depends on exposure to solid aerosol in the working environment.

Measurement or estimation of actual human exposure, coupled with appropriate assumptions about associated health effects or limit values (e.g., acceptable daily intake, tolerable daily intake), is the standard method used for determining whether intervention is necessary to protect and promote human health. [1]

2 ASSESSMENT OF EXPOSURE TO SOLID AEROSOL

Procedure of assessment of exposure to solid aerosol is based on standard EN 689. It is very universal procedure. It can be also modified. The modification depends on many factors for example type of solid aerosol.

Assessment of exposure to solid aerosol consists of steps: assessment strategy, measurement strategy, measurement procedure, conclusion of assessment.

Assessment of exposure to solid aerosol is realized at the first evaluation and then after every significant change of working conditions, change in technology or change of limit values in legislation.

The figure 1 shows procedure of assessment of exposure to solid aerosol. [2]

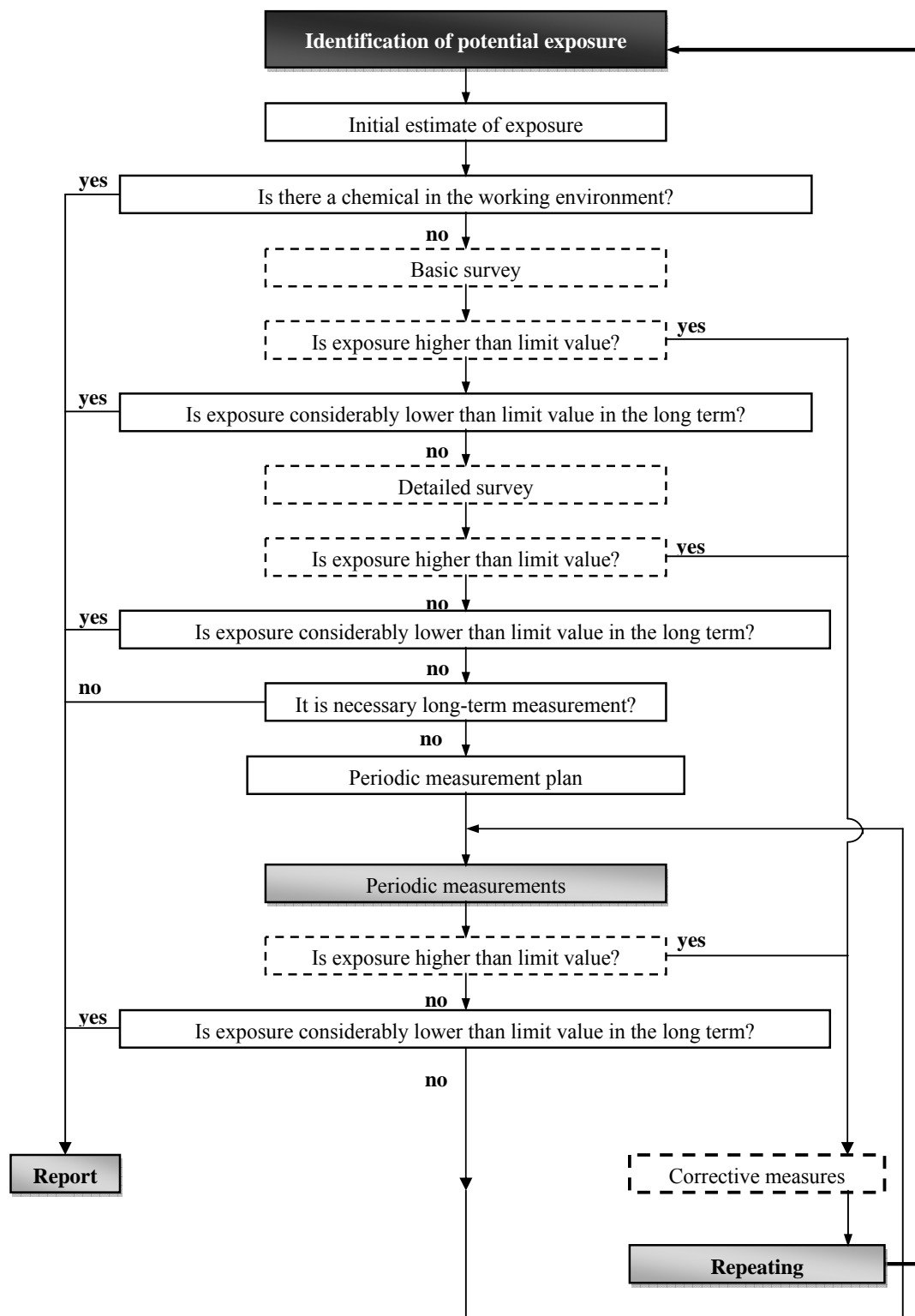


Figure 1: Procedure of assessment of exposure to solid aerosol by EN 689



2.1 Assessment strategy

Assessment strategy is introduction to assessment of exposure to solid aerosol. It consists from three parts. Each of this sections includes concrete actions:

1. Identification of potential exposure:
 - preparing the list of chemicals,
 - determination limit value for chemicals.
2. Determination of workplace factors:
 - determination of working process and procedure,
3. Evaluation of exposure
 - initial estimate,
 - basic survey,
 - detailed survey. [2]

2.2 Measurement strategy

Measurement strategy is selected on the base of the assessment strategy. It includes the following steps:

- employees selection. It can be: casual, grouping workers into homogeneous groups or based on to the experience.
- measurement in the fixed point. It can be used only in certain cases. The measurement is realized close to employees' breath area.
- selection measurement conditions. It depends on kind of measurement.
- progress of measurement. It can be affected by different conditions: the frequency and duration of work tasks, analytical conditions etc. If conditions during the measurement are without significant changes, sample time could be shorter and minimal number of samples could be lower. [2, 3]

2.3 Measurement procedure

Measurement procedure must offer representative results.

Process of measuring includes:

- specification chemicals,
- sampling procedure,
- analytical procedure,
- sampling points
- duration of sampling,
- timing measurement and interval between measurements,
- calculations of concentrations of chemicals in the work environment of individual analytical values,



- other technical instructions for measurement,
- work activities which should be monitored.

In the case if is possible, it should be used equipment for personal sampling. This equipment is placed directly to the employee's clothes. Sampling head is placed close by employee's breath area. It is the best way how to obtain relevant results. [2]

2.4 Conclusion of assessment

It is necessary to formulate conclusion of assessment irrespective of previous three steps of assessment. This conclusion is formulated based on comparison. It means comparison between calculated results and the limit value (LV) – highest permissible exposure limit. These limit values are notice in legislation. Limit values are determined by the whole working time as average value of the overall concentration exposure of solid aerosol or respirable fraction of solid aerosol. There are three possibilities:

- exposure is higher than limit value – it is necessary to adopt appropriate corrective measures and also periodic measurements (PM) are necessary,
- exposure is considerably lower than limit value – it is not necessary to adopt corrective measures and periodical measurements,
- exposure is just below the limit value – periodic measurements are required. [1, 2]

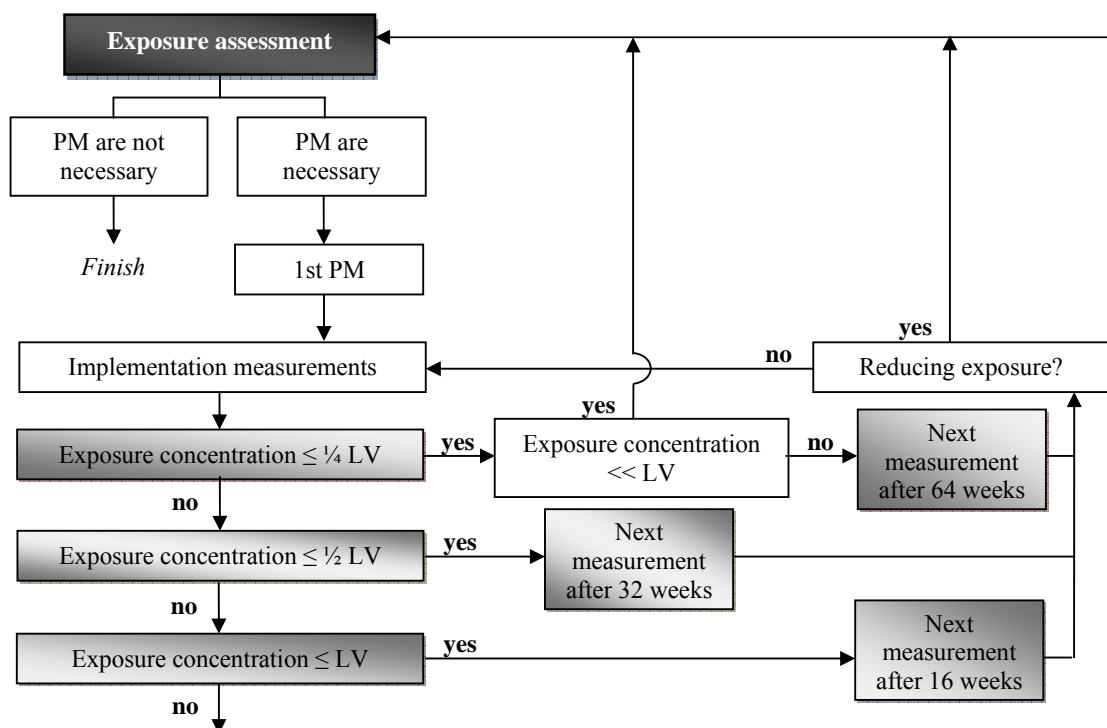


Figure 2: Periodic measurement



The highest permissible exposure limit is for two basic groups of solid aerosols:

- solid aerosols mostly with toxic effects,
- solid aerosols without toxic effects.

If there is in working environment more than one substance, they will influence together. Limit value will be calculated by the equations. These equations are notices in legislation.

Whole process of assessment exposure to solid aerosol is finished after the elaborating of Report of measurement. [3]

3 FINAL REMARKS

In this paper there was shortly characterized process of assessment exposure to solid aerosol in the working environment.

This process also enables:

- assessment dustiness in working environment,
- evaluation effectiveness of the used measures for decreasing dust production,
- assessment risk of dust or assessment individual dust load,
- appreciate machines, technological process or working operation,
- provide background papers for epidemiological research. [1]

The procedure described in this paper can be used for different chemicals (not only solid aerosol).

References

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- [2] EN 689: *WORKPLACE ATMOSPHERES. GUIDANCE FOR THE ASSESSMENT OF EXPOSURE BY INHALATION TO CHEMICAL AGENTS FOR COMPARISON WITH LIMIT VALUES AND MEASUREMENT STRATEGY*.
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Acknowledgement:

This paper was supported by the project KEGA 3/7422/09 and KEGA 3/7426/09.

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