Sampling strategy: EN689:1995 prEN689:2016

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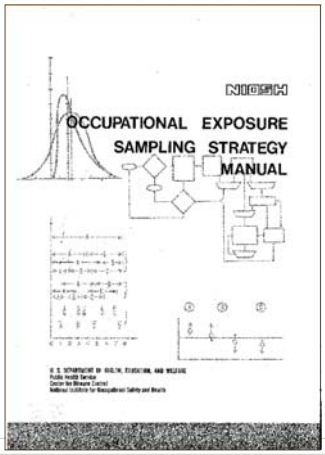
Why a strategy?

- Limit values have to be complied with on a regular, long term basis (not just one day).
- It is impossible to assess exposure to chemical agents on a every day basis.
- It is generally accepted that exposures follow a log-normal distribution.
- The parameters of the distribution are estimated using a limited set of samples.
- A strategy has to be designed to be a useful tool for employers.

Limit values

- Limit values are an important instrument for the prevention of ill health.
- They are to be used as a step in the hierarchy of preventive measures (not as a stand alone approach).
- Three elements are essential for the definition a limit value: a concentration in air (units); a target (breathing zone) and a reference period.



European Directive 88/642/EEC Chemicals, physical and biological agents

This directive has given a big boost to standardisation of workplace measurements via CEN TC 137 (start October 1988)
WG 1: sampling strategy
WG 2: general requirements on methods (e.g. EN 482)
WG 3: particulate matter (e.g. EN 481)
WG 4: terminology

EN 689:1995 measurement strategy

- Use of the word "compliance" was forbidden (!) ("conflict with regulation")
- Participants with different agendas
- Systematic approach using annex of directive as a framework
- Two distinct phases: "first" assessment; periodic measurements

EN 689: 1995
Systematic approach

- Possible exposures: list of substances
- Workplace factors: sources, configuration of the workplace, processes, tasks/activities of workers, collective preventive measures
- Selection of workers for measurements
- Homogeneous exposure groups
- Stationary versus personal sampling
- Representative versus worst case measurements
- Conclusion
- Reporting: importance of contextual information

Annexes of EN 689:1995

- All annexes are informative
- Annex A: minimum of samples for a homogeneous working period
- Annex B: calculation of time weighted average
- Annex C: formal procedure to evaluate workers exposure within the occupational exposure assessment.
- Annex D: approach based on statistical principles

Annexes EN 689:1995

- Annex E: periodic measurements
- Annex F: selection of intervals between periodic measurements.
- Annex G: Statistical analysis of data: moving weight average; probability plot.

Fundamental remark

- Given a widespread reluctance towards workplace measurements the standard EN689:1995 was written with the focus on efficiency. (reduction of number of measurements)
- This approach can lead to a poor efficacy: obtain wrong conclusion: "working conditions are well controlled" (but in reality they are not!)

Reluctance towards measurements ?

- "Measurements are too expensive!"
- No expertise available
- "Measurements do not solve any problem"
- "What the eye does not see, the heart does not grieve over". (report)
- Benefits for employers with measurements compared to employers with no measurements ? (> < accidents)
- Sanctions ?

Revision EN 689:1995

Start June 2013

Convenor: Raymond Vincent INRS

Secretariat: Florence Saillet AFNOR

Apart from ex-convenor, no "ancient warriors" from former CEN TC 137 WG 1

Context totally different than in 1988: existence of EN 689, no possible conflict with Directive (CAD very vague, not to say "wooly") or with European Commission; knowledge and expertise on distribution of exposures has dramatically increased.

Inspiration first draft revision

- Existing EN 689
- BOHS-NVvA strategy
- French regulation

Important changes (main text)

- Screening test (5.5.2)
- Compliance test (5.5.3) with quantitative criteria (at least 70 % confidence whether less than 5 % of exposures in the SEG exceed the OELV). Test in Annex F.

Important changes (annexes)

- Simultaneous exposure to several chemical agents (Annex C)
- Exposure profile and sampling duration (Annex D):

  replaces partly (reasonable) "worst case" measurements.
- Setting the interval for periodic measurements (Annex I)

Missing sentences in prEN689:2016 (1)

- Where it is suspected that exposure levels are well below or well above the limit values, these clear cases may be confirmed by the use of techniques which are easily applied and which may be less accurate. Other possibilities may be worst case measurements, sampling near emission sources or screening measurements. Thus, in these cases, the occupational exposure assessment may be completed without further investigation.

  (EN689:1995 5.2. Measurement strategy)

Missing sentences in prEN689:2016 (2)

- If, for the purposes of determining the 8-hour time weighted average exposure, the concentrations found in these cases (i.e. worst case measurements) are presumed to apply for the whole of the working period, then this presumption will err on the side of safety. Thus , sampling efforts can be concentrated on periods with relatively unfavourable conditions.

  (EN689: 1995 5.2.3.2 Worst case measurements)

Some reflections

- The convenor, the secretary and the working group have prepared a nice piece of work which will be useful for the employers who want to demonstrate compliance with limit values using measurements .
- The 0,1 fraction of the OELV is an important decision factor in the procedure. With the lowering of the OELVs this required limit of quantification is sometimes ambitious even for one single substance.
- In most workplaces exposure occurs to more than one agent. While applying Annex C, how often an exposure below 0,1 OELV (for the mixture) will be achievable ?