



Structure and content of the draft standard EN 689

Members of the TC137/WG1 Monitoring Strategy

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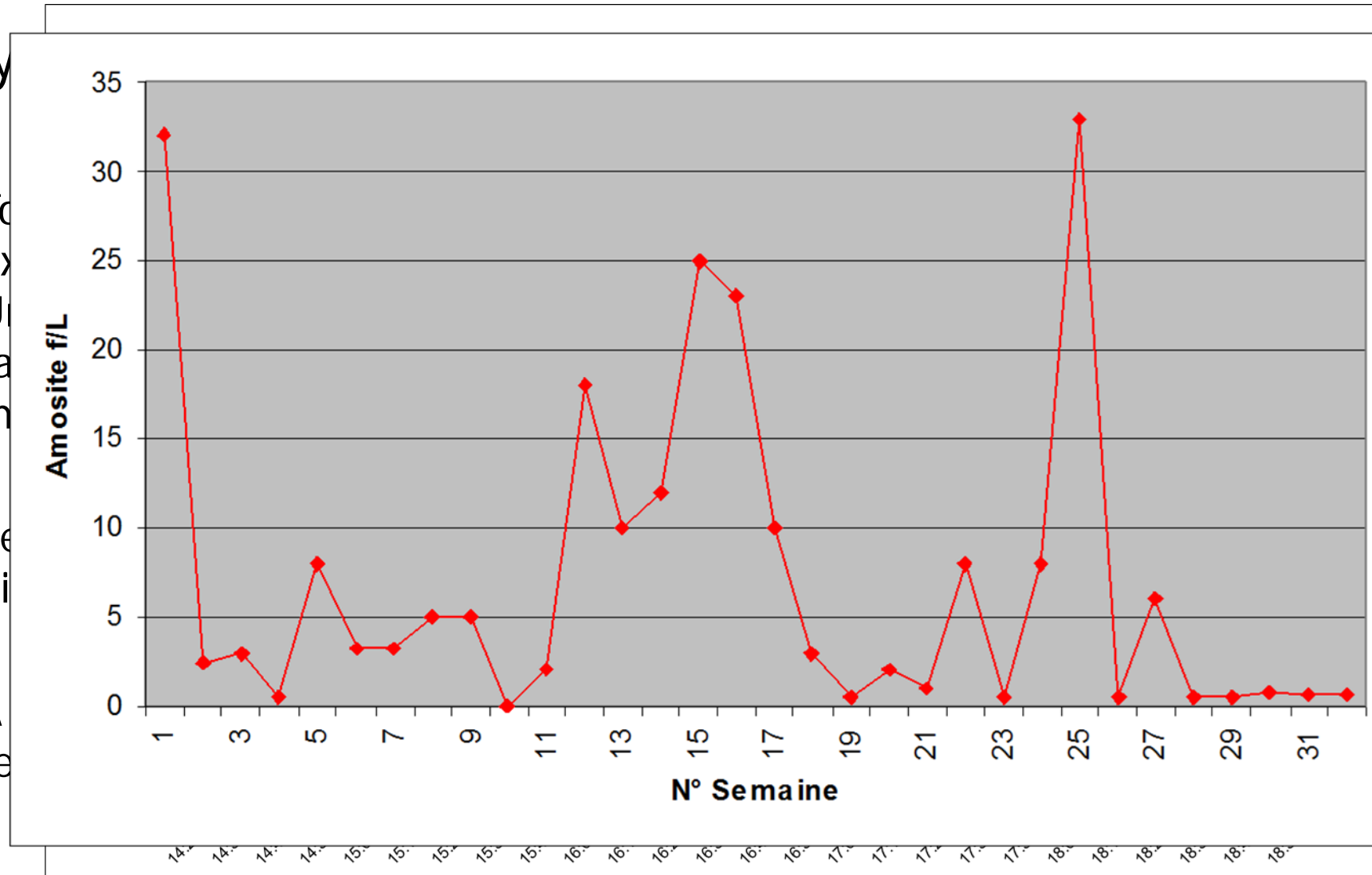
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Measurement of exposures to chemicals and Occupational Exposure Limit Values (OELVs)

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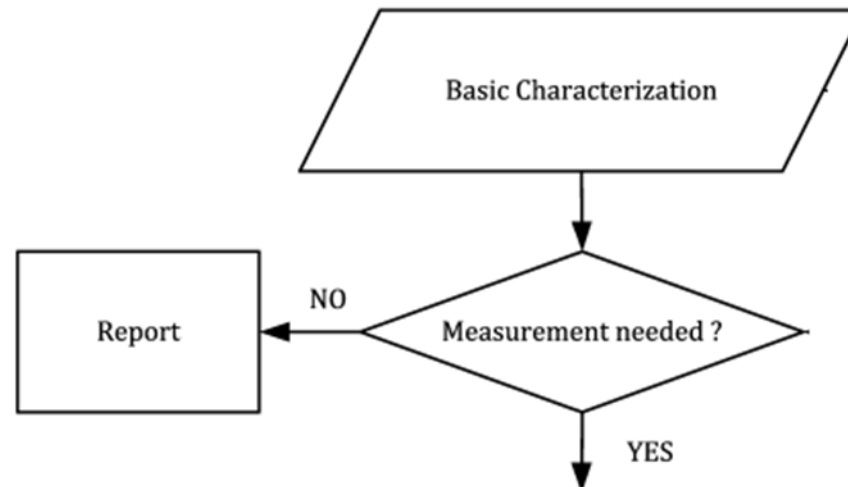
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EN 689 Draft

- The strategy described in this standard gives a procedure to perform a relatively small number of exposure measurements to demonstrate with a high degree of confidence that workers are not likely to be exposed to concentrations higher than the OELV considering the variability of exposures.
- Two main Phases :
 - Initial assessment
 - Periodic measurements (reassessment)
- The approach is applicable to any type of OELV (*Annex B :Occupational exposure limit values for compliance testing*) and whatever the nature of the chemical agent: CMR or hazardous

Initial Assessment – several steps

- The basic characterization :
 - Identification of chemical agents (hazards, OELVs, physical properties);
 - Identification of determinants of exposure;
 - Estimation of exposure
- *Annex A (Exposure assessment)* gives guidance on when measurements are advisable or if other approaches of assessment may be used.



Initial Assessment –Sampling Strategy

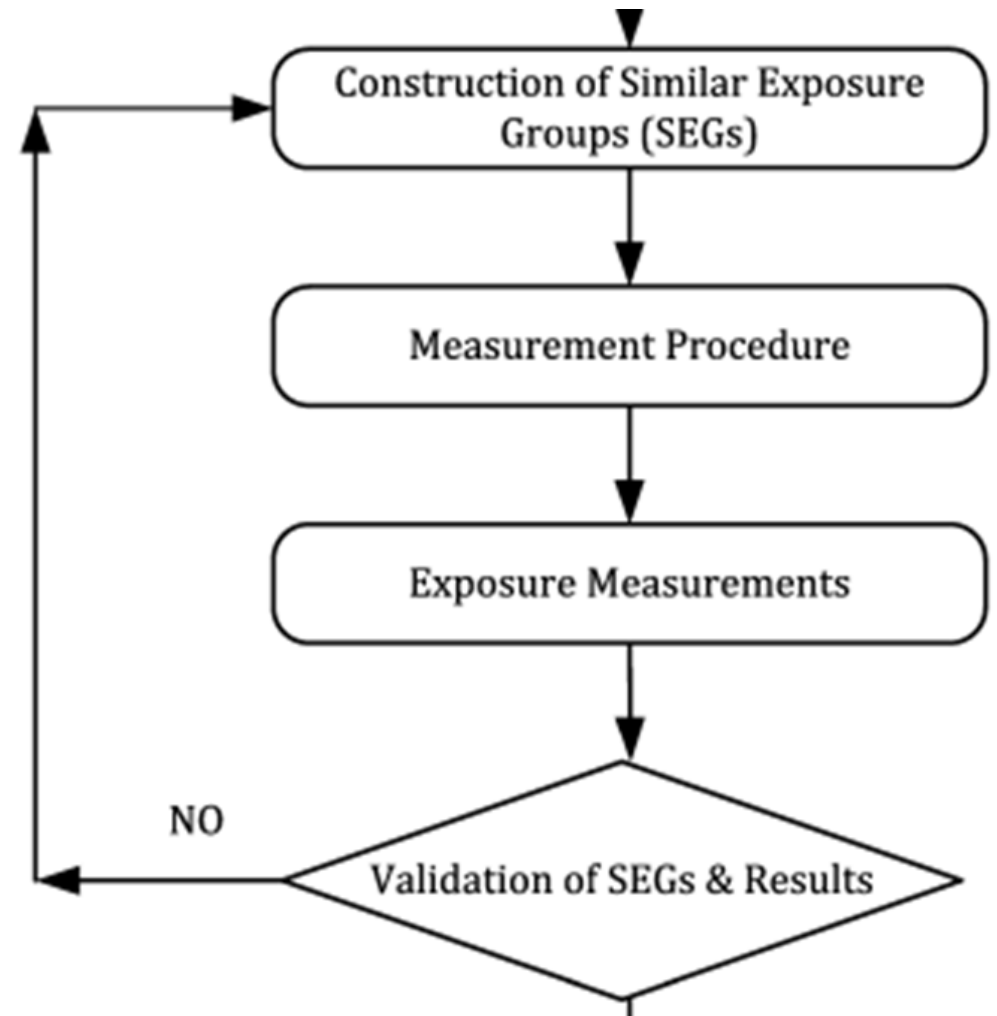
- Constitution of Similar Exposure Groups (SEG)
 - > *Group of workers having the same general exposure profile for the chemical agent(s) being studied because of the similarity and frequency of the tasks performed, the materials and processes with which they work, and the similarity of the way they perform the tasks.*
 - > *a SEG can include workers from different locations*
- Based on few representative exposure measurements obtained on some workers of the SEG, if the results indicate that the OELVs are met (compliance), then it is considered that this is so for all workers of the SEG

Initial Assessment- Measurement Procedure

- The measurement procedure shall give results representative of worker exposure
 - Sampling and analytical techniques in accordance with standards (EN482)
 - Personal sampling shall be used (breathing zone)
 - The sampling duration should be representative of the reference period of the limit value controlled : OELV-8h TWA or OELV-15 min (STEL), at least 2 hours for stable situations of exposure (*Annex D : Exposure profile and sampling duration*)
 - Measurements should be performed on sufficient days and during various specific operations (variability)
 - The minimum number of measurements depends on the statistical used to test compliance with OELVs (3-6)
 - The number of workers belonging to the SEG shall be taken in consideration to determine the number of measurements
 - The appraiser shall remain on site to monitor the success of the sampling operation and to collect all informations to interpret or validate the results

Initial Assessment – Validation of SEGs and results

- The representativeness of each sample shall be evaluated :
 - Results of analysis
 - Information collected
 - Identification of outliers
- Confirmation *a posteriori* of each SEG :
 - Log normal distribution of results
 - Detection of exceptional exposures
- Annex E : Check of log-normality of exposure measurements, and identification of exceptional exposure within the SEG



Initial Assessment – Testing Compliance with OELVs

- Prerequisites

- Log-normal distribution assumption, SEGs... confirmed
- In case of simultaneous exposure to several chemical agents having a OEL, the exposure index for the mixture is compared with 1 (*Annex C : Simultaneous occupational exposure to several chemical agents*)
- In the case of extended work shift, the daily exposure (E_d) is calculated for comparison with OELV (*Annex G : Exposure calculation for workers with unusual work shift*)
- Treatment of results below the limit of quantification (LoQ) (*Annex H:Measurements below the limit of quantification*)

- Compliance

- 3-5 results
- ≥ 6 results

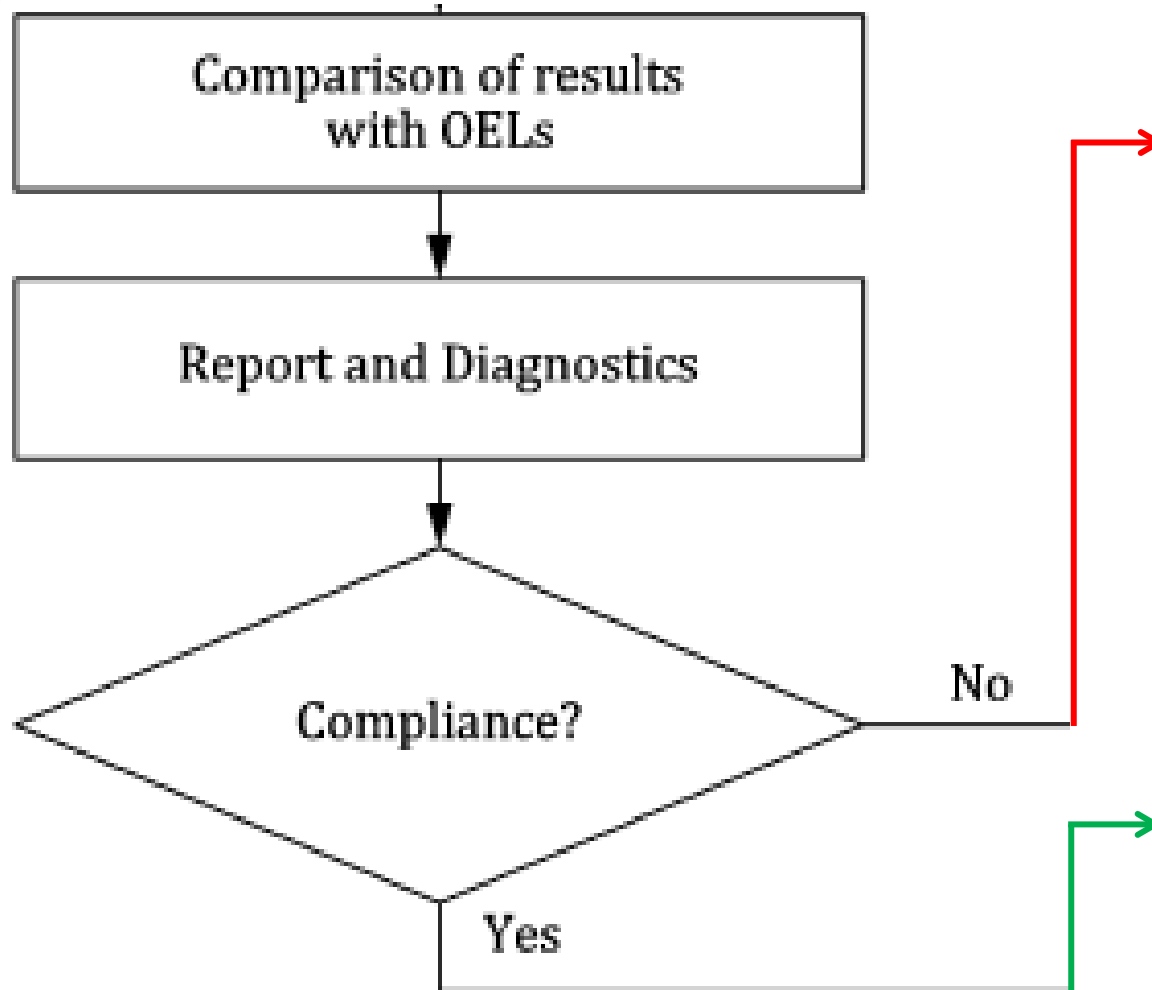
Initial Assessment – Testing Compliance with OELVs

- Screening test : 3-5 exposure measurements /SEG
- If all results are below :
 - 1) 0,1 OELV for a set of three exposure measurements or,
 - 2) 0,15 OELV for a set of four exposure measurements or,
 - 3) 0,2 OELV for a set of five exposure measurements
 - Then it is considered that the OELV is respected: **Compliance**.
- If one of the results is greater than the OELV, it is considered that the OELV is not respected: **Non-compliance**.
- If all the results are below the OELV and a result above 0,1 OELV (set of three results) or 0,15 OELV (set of four results) or 0,2 OELV (set of five results) it is not possible to conclude on compliance with the OELV. **No-decision**.

Initial Assessment – Testing Compliance with OELVs

- Statistical test : ≥ 6 results
 - The test shall measure, with at least 70% confidence, whether less than 5% of exposures in the SEG exceed the OELV. (Annex F : Statistical test for testing compliance with OELVs).
- This test is based on the comparison of the upper confidence limit of 70% (UCL) of the 95th percentile of the law of distribution of the results of exposure measurements with the OELV . UCL is calculated using geometric mean (GM) and standard deviation (GSD)
 - UCL < OELV **Compliance**
 - UCL > OELV **Non-Compliance**

Initial Assessment - Conclusions



- Implementation of risk management measures
- Start a new initial assessment

- Periodic measurements

Periodic measurements

- Workplace exposure assessment shall be updated periodically
- In general, an annual interval is recommended for reassessment
- When reassessment is conducted with exposure measurements, periodic intervals are proposed in Annex I (*Setting the interval for periodic measurements*).
- 6 measurements at least are necessary to determine the next period
- For periodic reassessments, at least three exposure measurements shall be collected per SEG.
- After validation, these results can be pooled with the earlier ones in order to test compliance and to determine the period before the next reassessment.

Periodic measurements

- Determination of intervals based on GM
 - $GM < 0,1$ OELV 36 months
 - $0,1 \text{ OELV} < GM < 0,25 \text{ OELV}$ 24 months
 - $0,25 \text{ OELV} < GM < 0,5 \text{ OELV}$ 18 months
 - $0,5 \text{ OELV} < GM$ 12 months
- Determination with at least 70% confidence, whether less than 5% of exposures in the SEG exceed a fraction j of the OELV
 - $j < 0,25$ - 36 months
 - $0,25 < j < 0,5$ - 30 months
 - $0,5 < j < 1$ - 24 months
 - If all measurements were less than 0,1 OELV in the original compliance test, reassess in 48 months.

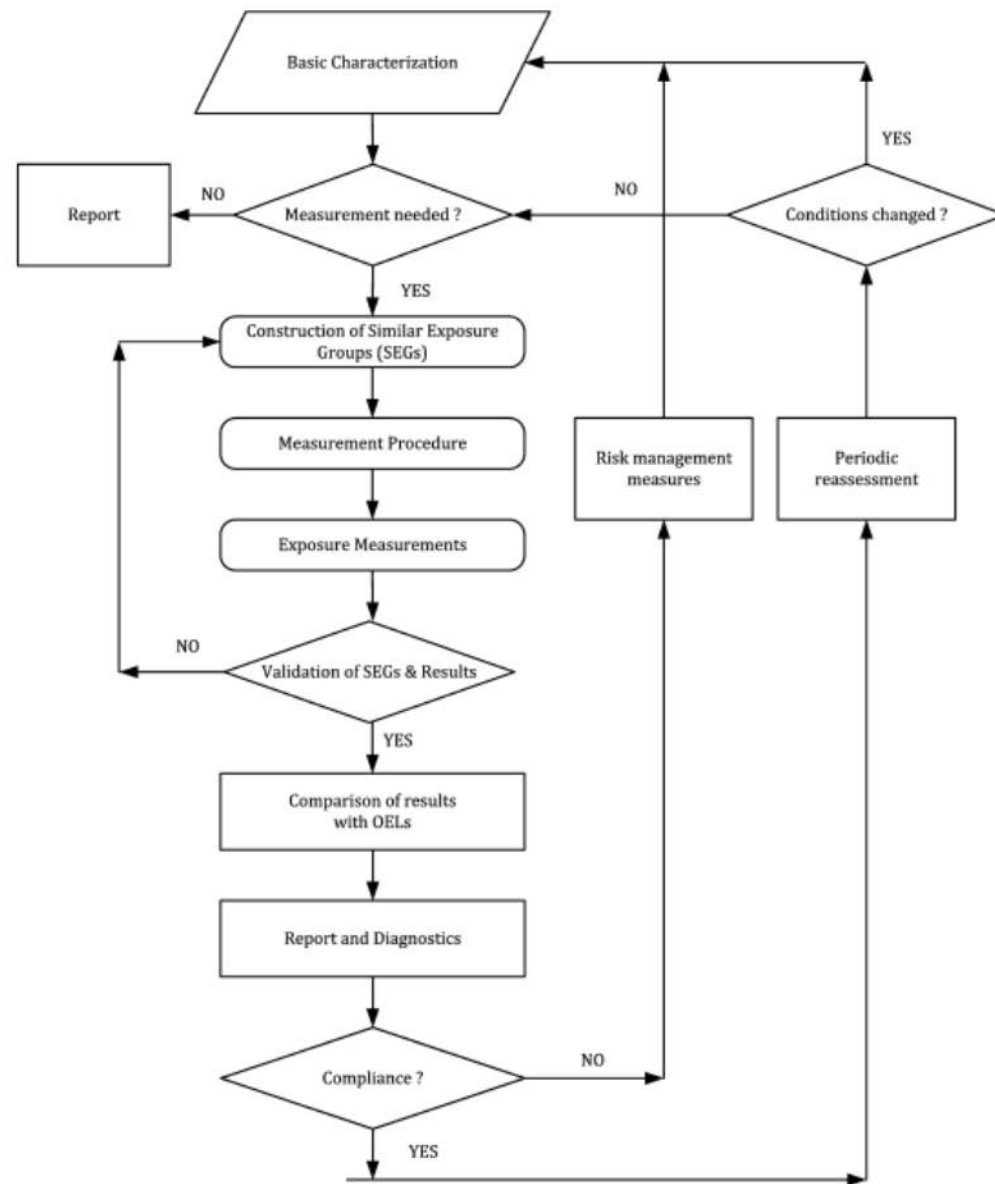


Figure 1 — Schematic overview of the strategy

From draft to EN 689

- Planning

- Currently being translated
- Beginning public inquiry in May 2016 - 3 months
- Analysis of comments issued from Europe in cooperation with the WG1 / CEN TC 137: 19 and 20 September 2016; 11 and 12 or 18 and October 19, 2016
- Sending the amended text late October or early November 2016
- Vote end of 2016
- Publication of the standard EN 689, if adopted in early 2017

