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Perspectives and Challenges of the Woodworking Industries in Europe
Joint CEI-Bois / EFBWW / EPF Project

European Action Guide for compliance with the occupational exposure limit of formaldehyde
in the woodworking industries - 2nd Draft for implementation throughout the EU

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**2nd Draft European Action Guide for
compliance with the occupational exposure
limit of formaldehyde in the woodworking
industries**

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1. Introduction

Since the first of January 2016, formaldehyde is classified as carcinogen 1B according to CLP criteria in Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures and is included in the Annex VI. Consequently, formaldehyde is also subject to EU Directive 2004/37/EC of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (CMD).

In the framework of the EU Regulation on chemicals (REACH), an Analysis of the most appropriate Risk Management Options (RMOA) is led by France and the Netherlands. France is in charge of performing the RMOA on the basis of the workers exposure to formaldehyde. Recently, formaldehyde was re-assessed by SCOEL (Scientific Committee on Occupational Exposure Limit) for deriving an OEL (Occupational Exposure Limit) both for short (STEL: Short term Exposure Limit) and long term exposure (TWA: Time Weighted Average). Since its classification as C1B, formaldehyde is in the scope of CMD (Carcinogens and Mutagens Directive) and will be subject to Binding OEL values (BOELVs) once these will have been included in the Annex III of CMD. SCOEL proposals (8 hour TWA: 0.3 ppm and STEL: 0.6 ppm) have been formally approved by the Advisory Committee for Health and Safety at work (ACHS) which recommends a prompt adoption of the BOELVs. Additionally, the registration dossier has been updated with refined DNELs which are now aligned on the SCOEL values; the SDSs and ESs have been updated also.

Nevertheless, the process of the BOELVs' adoption and their transposition at EU and national level might be longer than expected¹ and especially the French competent authority on REACH in charge of the RMOA has expressed concerns that it could take up to 10 years. 10 EU countries (Czech Republic, Germany, Sweden, Belgium, Finland, Denmark, Italy, Spain Slovakia, and Portugal) have already implemented an OEL of 0.3 ppm, which should facilitate the BOELV implementation of the SCOEL values in these countries.

¹ Indeed, there are ongoing discussions regarding the possible inclusion of formaldehyde in the 2nd or 3rd wave of BOELVs according to CMD. An OEL of 0.3 ppm is already in force in 12 EU countries (Czech Republic, Germany, Ireland, Sweden, Belgium, Netherlands, Finland, Denmark, Italy, Spain, Slovakia, and Portugal).

To accelerate these procedures, CEI-Bois member federation EPF has decided to launch proactively a voluntary agreement for implementing the adopted SCOEL values in all Member States where its members are located. This voluntary agreement shall prevent delay and shall ensure rapid achievement of a harmonised level playing field in terms of worker protection and prevention.

The following action guide is intended to help all concerned manufacturers in the woodworking industry to comply with the new OEL requirements. In particular for wood-based panels manufacturers, this Action Guide is the practical tool to demonstrate compliance with the EPF voluntary agreement referred to in the introduction.

With this procedure described in this action guide, based on the European reference standard EN 689, the manufacturers install a transparent system for all people in the production: employees, sub-contractors and visitors. So everybody is permanently informed about the situation regarding formaldehyde in each area and is able to act also on his own responsibility. This action guide generates confidence to act in safe conditions and provides an efficient programme to reduce exposure to formaldehyde that must be implemented under co-responsibility of the workers.

With the implementation of this guide and the generated data pool for each plant, best practices can be developed for each area within the entire wood-based materials industry in the EU.

2. Risk assessment process

In several member states these steps are already standard and follow national requirements:

1. Inform worker and the Hygiene, Health and Safety Committee
2. Refer to OELVs agreed by SCOEL reflecting the hazard of formaldehyde
3. Define activities and areas subject to assessment
4. Define and carry out measurement campaign at workplace
5. Implement an action plan
6. Update the risk assessment
7. Communication of results
8. Documentation

The philosophy of this Action Guide is to rely on national provisions as several

Member States already adopted OELs at least equal to the SCOEL recommendation and/or measurement strategies, although these national OELs do not all have the status of a Binding OEL. For countries not having already implemented such approach, it is recommended to refer to the European Standard EN 689 “Workplace exposure - Measurement of exposure by inhalation to chemical agents - Strategy for testing compliance with occupational exposure limit values” (most recent version prEN 689 dated June 2016).

2.1 Inform worker and Hygiene, Health and Safety Committee

Before initiating any risk assessment activities leading to measurement campaigns resulting from the implementation of this Agreement, it is recommended to inform workers and the Hygiene, Health and Safety Committee and, if relevant, workers’ representatives.

2.2 Refer to OELVs agreed by SCOEL reflecting the hazard of formaldehyde

The following Occupational Exposure Limit Values recommended by the EU Scientific Committee on Occupational Exposure Limits (SCOEL) and agreed by the Advisory Committee for Health and Safety at work (ACHS) shall be the reference values for the purpose of this Agreement:

- 8-hour TWA: 0.3 ppm (0.369 mg/m³)
- STEL: 0.6 ppm (0.738 mg/m³)

2.3 Define activities and areas subject to assessment

During the manufacturing process for wood-based panels, potential concentrations of formaldehyde can be anticipated in the air that exceed the OEL (i.e. the occupational exposure limit). (REFWOOD study in 2010)

In particular in wood-based panels manufacturing, this affects the areas of forming lines, adhesive bonding of woodchip and wood fibres and the conditioning of panels. For activities in these areas, specific measures must be adopted to ensure compliance with the OEL.

Other areas such as timber preparation, storage, press control station are usually non-critical, but this must be verified on a case-by-case basis through measurements.

To demarcate the affected areas, it is advisable to sub-divide the production area into individual zones on the basis of their potential formaldehyde, e.g. in a wood panel factory from adhesive bonding to conditioning. For these areas, the concentrations of formaldehyde must be determined and, based on that, the required protective measures (technical, organisational or personnel-related) must be extrapolated. When defining these zones, it may be necessary not only to sub-divide into two-dimensional surface areas, but also into three-dimensional areas to take account of the effect of hot fumes rising to higher levels. This sub-division should be based upon the average concentrations of formaldehyde determined in a stationary manner in each of the affected zones.

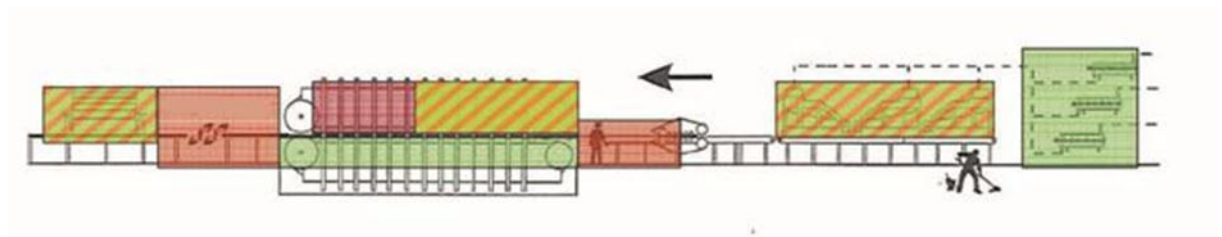


Figure: Example of division of working areas at the forming line based on zone system in exposure areas [proprietary presentation]

This enables employees to visualise areas of the plant where occupational exposure limits (OELs) may be exceeded, and therefore to identify each of them clearly from areas where this does not apply. This procedure makes it possible to keep the exposure level of individual employees below the OEL level in the course of a single shift as activities are performed in the different areas of the plant.

These areas can be sub-divided in accordance with the following 'zone model':

Zone	Green	Green/Red	Red
FA concentration X [ppm]	$X < 0.3$	$0.3 < X \leq 0.6$ Max 15 minutes 4x per shift	$X > 0.6$
	SAFE	Appropriate PPE to be made available for voluntary use	Appropriate PPE required

It is not permissible to spend more than 15 minutes in the **Green/Red Zone**

without appropriate personal protective equipment (PPE) because the OEL value may be exceeded in this case. At least 1 hour must elapse between two consecutive 15 minute working periods in this zone. In total, 4 brief periods of exposure are permitted during one shift. At the mid-point of the shift, compliance with the OEL is always mandatory.

Away from the ongoing operation of the production facility, it is easily verified that formaldehyde concentrations are substantially below 0.3 ppm and consequently can be labeled Green and are accessible without risks relating to formaldehyde exposure.

When the plant is at a standstill or when adhesive bonding does not involve the use of formaldehyde, zone demarcation is lifted. The zones can then be accessed without any possible risk to personnel.

For determining each zone, 3 or more stationary measurements shall be undertaken under standard production conditions in order to obtain a representative overview of the formaldehyde exposure levels in each of the defined zones and to document the measuring value per production area in the table in clause 2.4.

2.4 Define and carrying out measurement campaign at workplace

In the absence of national provisions, all companies in the woodworking sector using formaldehyde-based chemicals and especially all EPF members shall perform workplace quantitative assessment to assess compliance with the OELVs. The following approach takes into account EN 689.

Depending of the characteristics of work organisation, existing practice ... two distinct approaches can be suggested.

- 1) Assessment based on stationary measurements and definition of exposure level areas
- 2) Assessment based on personal monitoring and Similar Exposure Groups (SEG) unless technical feasibility

As described in EN 689 (A.6 Workers who move from a workplace to another with irregular exposure personal monitoring), where work is performed at locations which change a number of times a day by localisation and formaldehyde exposure, it is quite difficult to measure the right formaldehyde exposure by personal monitoring. Stationary measurements are much more reliable for this purpose than personal measurements, because they allow to

support and fine-tune the zone demarcation on the basis of actual measurement data taking all the specificities of the factory fully into account.

For the individual working periods in different areas, a stationary measurement at these points, combined with a calculated personal associated exposure time factor, is recommended and described in this action guide (see EN 689 Annex G Exposure calculation for workers with unusual work shift). All these measures assume that the exposure situation for the respective activity has been identified and assessed beforehand on a sector basis.

For this, stationary measurements of areas are calculated in conjunction with a model. To do this, a time profile for the workplace to be evaluated, e.g. the press inspection station, must be produced to show how long is spent in which zone. These times should be determined on the basis of standard working days. Then by converting the emission level to the average length of exposure time, compliance with the limit value is checked. Red zones, where access is restricted to only people wearing appropriate personal protecting equipment (PPE), are calculated with an emission of 'zero' in accordance with EN 689:

Example:

Area	Measuring value [ppm]	Zone	Average time spent during one shift [hrs]:	Calculation [ppm]:
Adhesive coating	0.15	Green	0.5	0.01
Spreading	0.30	Red/White diagonal stripes	2 x 0.25	0.02
Pre-press	0.70	Red	0.5	0.00
Adhesive bonding press	0.20	Green	2	0.05
Diagonal saw	1.00	Red	0.25	0.00
Cooling star turner	0.40	Red/White diagonal stripes	0.25	0.01
Control room	<0.1	Green	4	0.00
Result of mean value per shift:			8	0.09

This calculation must be performed for every workplace where multiple formaldehyde exposure scenarios can occur during a complete shift. To document the compliance of the mean value per shift, a value of this kind must be calculated from the existing measurements.

Verification of inhalation exposure should consist of statements relating to the existing protective measures as well as definitions of any other measures that

may need to be taken, including an effectiveness check. At regular intervals or when the need arises, check to ensure that the findings derived are applicable without change (effectiveness check). The intervals between these checks depend on operational conditions, to be established during the assessment. An annual basis is advisable, although wherever possible, seasonal factors governing the level of exposure should also be taken into account. Possible reasons for needing to conduct a check may include the following examples:

1. a change in relevant parameters,
2. a change in the applicable status of the identification process (measuring method, calculation model, ...),
3. a change in the assessment standards, changes in limit values or
4. a change in factors significant for obtaining a reliable outcome.

If the changes are of significance for inhalation exposure, the findings must be updated.

2.5 Implement an action plan

The action plan should comply with the hierarchy principle:

Substitution, followed by technical, organisational and personal protective measures (STOP hierarchy of measures).

The action plan can include one or all of the following improvements:

- level of containment of facilities and/or equipment,
- capture of canalised emissions
- control of fugitive emissions
- general ventilation
- efficiency of local exhaust ventilation
- work organisation to reduce duration of exposure
- training and information of workers and their representative
- selection, storage and maintenance of PPE and training of workers

2.6 Update the risk assessment

Periodic reassessment will depend on national requirement and the exposure concentrations compared to OELs. It is expected to focus the periodic assessment on tasks, functions, areas where the workplace concentrations exceed the OELVs or it is close to them. It is expected to realise a yearly reassessment.

2.7 Communication of results

Collective results should be communicated to workers, their representatives and to the health and safety plant committee according to applicable laws and practices. Individual and nominative results have not to be reported to workers collectively. Nominative results should be communicated to workers individually by the plant management or the occupational physician in full compliance with national regulations.

2.8 Documentation

Measurement campaigns, whatever the measurement strategy, are systematically subject to measuring reports which should especially include details of workplace and production conditions, results by SEG or task, as the case may be.

Results of measurement campaigns and R&D / literature search regarding substitution of formaldehyde should be made available in case of inspection by enforcement authorities.

3. Time schedule and Reporting

3.1 General

CEI-Bois and EFBWW members who implement this Action Guide during the course of this EU Social Dialogue WOOD Project are encouraged to inform the Project Leader of their experiences. This will preferably include:

- Report on the risk assessment procedures followed
- Description of the production and division of the zone system and working areas;
- Measurement values in support of the zone definition for each production area (mean, maximum, and number of test results);
- Number of workers trained and participating in the implementation of the Action Guide and comments received.

3.2 EPF members under the voluntary agreement

All EPF member companies under the voluntary agreement shall implement

this Action Guide in all their panel manufacturing facilities in the EU and report to EPF directly or via the national member association(s) to which they are affiliated:

- Division of the zone system and working areas for all their wood panels manufacturing lines located in the EU;
- Measurement values in support of the zone definition for each production area (mean, maximum, and number of test results) for each factory;
- Results of mean values per shift in accordance with the table in clause 2.4;
- Number of workers trained and participating in the implementation of the Action Guide;
- Name of the company responsible who is authorised to answer questions.

Time schedule in accordance with the EPF BOEL voluntary agreement proposal to ANSES:

- 2017: Europeanisation of the German Action Guide on Formaldehyde and preparation of the implementation (Year 0);
- 2018: Zone definition on the basis of stationary measurements by all Member companies and start of reporting to EPF:
 - Zone definition for each factory and number of workers informed by the end of the 2nd Quarter;
 - Measurement values supporting the zone definition and number of workers trained.
- 2019: All companies start full reporting to EPF with a focus on:
 - number of factories implementing the Action Guide
 - number of worker participating in this implementation
 - Results of mean values per shift in accordance with the table in clause 2.4;
 - Revised zone definition where relevant.
- 2020: EPF starts establishing a library of the implementation of the Action Guide