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

Autonomous Agreement on a European Action Guide regarding the prevention of formaldehyde exposure in the European panel industry and compliance with the occupational exposure limits

FINAL Draft European Action Guide for compliance with the occupational exposure limit of formaldehyde in the wood-based panels industries

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0. **Preamble**

The social partners of the European wood working industry traditionally pay strong attention to occupational safety and health.

Complying with the EU legislation plays a key role in improving the level of protection in the panel producing industry. We agree that investment in OSH adds value to productivity and performance as well as the protection of worker health.

This agreement on formaldehyde builds upon the European Framework Directive on the protection of Workers at work and upon the European Directive on the protection of workers to the exposure of carcinogens and mutagens at work.

This agreement is proactively implementing the occupational exposure limits recommended by the European Scientific Committee on Occupational Exposure Limits (SCOEL) and proposed by the European Commission. It therefore aims at accelerating the European-wide protection of workers and does not intend to interfere in European legislative processes.

Given that formaldehyde is included in the European Commission proposal (3rd batch) to revise the European Directive on the protection of workers to the exposure of carcinogens and mutagens at work, the signatories have no intention anymore to ask the European Commission for a transition of this agreement into a European Directive or as an Annex to an existing European Directive on worker protection to occupational risks.

The agreement sets minimum requirements applying without prejudice to European, national or sector regulations or other type of legal requirements and is built on a non-regression objective.

This agreement aims to promote collaboration between social partners at all levels within the spirit of the EU Social Dialogue whilst respecting different cultures in industrial operations at local level. The action guide is designed to be readily available for implementation in the factories.

The signatories agree that technical progress is taken into account wherever this agreement comes into force: technical progress in processing machinery or ventilation and exhaust ventilation systems or other technical equipment used to prevention exposure.

1. Introduction to the action guide

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).

Since its classification as C1B, formaldehyde is in the scope of CMD (Carcinogens and Mutagens Directive) and has been prioritized to 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 Safety and Health at work (ACSH) which recommends a prompt adoption of the BOELVs.

To accelerate the entry into force of the agreed BOEL, the signatories have decided to launch proactively an autonomous agreement for implementing the adopted SCOEL values in all Member States where its members are located. This agreement shall prevent delay and shall ensure rapid achievement of a harmonised level playing field in terms of worker protection and prevention.
This action guide is intended to help all concerned manufacturers in the wood-based panels industry to comply with the new OEL requirements. This Action Guide is the practical tool to improve health protection and demonstrate compliance with the EPF voluntary commitment (see annex).
With this procedure described in this action guide, based on the European reference standard EN 689, the manufacturers install a transparent system for all workers in the production. And for sub-contractors and visitors where appropriate. 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 via social dialogue at the workplace and in co-operation with 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. Area of application

The area of application of this agreement is the wood-based panel industry in the EU.

The area of application in terms of organizational areas of the company covers all parts of the company where exposure to formaldehyde is given or possible (see also paragraph 4.3).

The individual area of application covers all workers working in areas for which this agreement is valid.

3. Workers participation

1. Inform workers representatives, workers and the Hygiene, Health and safety Committee about this agreement and all related activities.
2. Involve workers representatives and concerned workers in all phases of the risk assessment, the definition of an action plan including installing the necessary preventive measures and the evaluation of its effects.

3. Collective results should be communicated to workers, their representatives and to the health and safety plant committee according to applicable laws and practices.
4. 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 health practitioners in full compliance with national regulations.
5. Workers and workers' representatives receive sufficient and appropriate training in particular in the form of information and instructions, concerning:

    - Potential risks to health
    - Precautions to be taken to prevent exposure
    - Hygiene requirements and the use of protective equipment and clothing

The training shall be repeated in case of changes in production conditions and periodically if necessary.

4. Action Plan

The Action Plan shall include a risk assessment process, prevention measures, procedures to ensure, as a minimum requirement, compliance with the OEL and reporting procedures. Based on the risk assessment, the necessary preventive measures shall be applied.

1. Refer to OELVs agreed by SCOEL and proposed by the European Commission
2. Define activities and areas subject to assessment
3. Define and carry out measurement campaign at workplace
4. Implement an action plan
5. Update the risk assessment
6. Communication of results

This Action Guide is based on national provisions as several Member States already adopted OELs - at least equal to the SCOEL recommendation and proposed by the European Commission - 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). This standard describes in detail the different measurement strategies for the different exposure scenarios. Both stationary and personal measurements are used.

4.1 Risk assessment process

The risk assessment shall comply with the national transposition of the requirements of Article 3 in the Directive on the protection of workers from the risks related to exposure to carcinogens or mutagens at work.

In the case of any activity likely to involve a risk of exposure to carcinogens or mutagens, the nature, degree and duration of workers' exposure shall be determined in order to make it

possible to assess any risk to the workers' health or safety and to lay down the measures to be taken. The assessment shall be renewed regularly and in any event when any change occurs in the conditions which may affect workers' exposure to carcinogens or mutagens. The employer shall supply the authorities responsible at their request with the information used for making the assessment.

When the risk assessment is carried out, employers shall give particular attention to any effects concerning the health or safety of workers at particular risk and shall, inter alia, take account of the desirability of not employing such workers in areas where they may come into contact with carcinogens or mutagens.

In accordance with article 5 (j) of the CMD, wherever a carcinogen of mutagen is used, demarcation of risk areas and use of adequate warning and safety signs including 'no smoking' signs shall be applied in areas where workers are exposed or likely to be exposed to carcinogens or mutagens.

This Action Guide aims at fully implementing these principal requirements of the CMD.

4.2 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 complied with for the purpose of this Agreement:

- 8-hour TWA: 0.3 ppm (0.369 mg/m^3)
- STEL: 0.6 ppm (0.738 mg/m^3)

4.3 Define activities and areas subject to assessment

During the manufacturing process for wood-based panels, and without particular preventive measures used, potentially elevated concentrations of formaldehyde can be anticipated in the air, including concentrations 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 mat forming, pre-pressing, mat conveying and board pressing, sawing and cooling, sanding and cutting to size. For activities in these areas, specific preventive 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 (e.g. with the colour codes green, green/red and red – see figure), it is advisable to sub-divide the production area into individual zones on the basis of their potential formaldehyde emission and exposure, 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 implemented. 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.

According to the findings of the REFWOOD study in 2010, this sub-division should be based on the average concentrations of formaldehyde determined in a stationary manner in each of the affected zones or extrapolated from personal monitoring measurements.

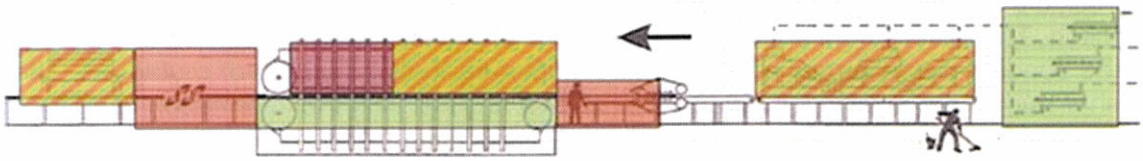

Figure: Example of division of working areas at the forming line based on zone ystem in exposure areas [proprietary presentation]

This enables to visualise areas of the plant where concentrations may be elevated and 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 workers as low as possible and below the OEL level in the course of a single shift as activities are performed in the different areas of the plant. The level of hazard can be defined from the existing level of risk. A high level of risk signifies a hazard, but a low level of risk cannot automatically be equated to absolute safety.

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 SAFE	0.3 < X 0.6 Max 15 minutes 4x per shift Appropriate PPE to be made available	X > 0.6 Appropriate PPE required

4.4 Preventive measures

Aiming to reduce the formaldehyde exposure in the wood-based panels industry, the following general safety guidelines must always be taken into account:

- Hazard prevention;
- Hazard control;
- General exhaust systems;
- Partially enclose machinery when feasible.

To improve the exhaust systems, it makes sense to maintain the extraction at optimum design rate, to partially enclose machinery when feasible and to mark areas with high formaldehyde emission, e.g.:

- Ventilation, including local ventilation
- Point nozzle suction
- Separate and reduce elevated concentration areas as far as possible
- Mark areas with elevated formaldehyde levels (Red zone)

It is not permissible to spend more than 15 minutes in the **Green/Red Zone** as defined in the table above without appropriate personal protective equipment (PPE) because the STEL 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 short term 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 or when the level of formaldehyde is below 0.3 ppm, zone demarcation is lifted. The zones can then be accessed without risks relating to formaldehyde exposure. The time limit between stopping the production and allowing access without PPE shall be defined at plant level on the basis of measurements.

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 emission levels in each of the defined zones and to document the measuring value per production area in the table in clause 2.4. The determination of zones can also be deducted from personal monitoring measurements.

4.5 Define and carrying out measurement campaign at workplace

All EPF members shall perform workplace quantitative assessment to assess the level of emission and exposure and the need for installing preventive measures, and to be in compliance with the OELVs.
Depending of the characteristics of work organisation and existing practices two distinct approaches are suggested in accordance with EN 689.

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

For this, personal measurements shall be undertaken or stationary measurements of areas shall be 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 shall be checked. Red zones, where access is restricted to only people wearing appropriate personal protecting equipment (PPE), shall be calculated with an emission of 'zero' in accordance with EN 689:

Example:

Area	Measuring value	Zon	Average time spent during one shift [hrs]:	Calculation
Adhesive coating	0.15		0.5	0.01
Spreading	0.30		2 x	0.02
Pre-press	0.70		0.5	0.00
Adhesive bonding	0.20		2	0.05
Diagonal saw	1.00		0.25	0.00
Cooling star turner	0.40		0.25	0.01
Control room	<0.1		4	0.00
Result of mean value per shift:			8	0.0

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 documentation 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.

4.6 Implement risk reduction and prevention measures

The action guide for risk reduction and prevention shall comply with the hierarchy principle: Substitution, followed by technical, organisational and personal protective measures (STOP hierarchy of measures). This includes:

- Risk assessment
- Prevention measures
- documentation
- evaluation of the results of the measures

Possible measures based on this action guide include 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

4.7 Update the risk assessment

Periodic reassessment will depend on Article 3 paragraph 2.4 in the CMD and national requirements and the exposure concentrations compared to OELs. Workplace concentrations

should be as low as possible. It is expected to focus the periodic assessment on tasks, functions, areas where the workplace concentrations may exceed the OELVs or it is close to them. It is expected to realise a yearly reassessment. In case of significant changes to the production, the risk assessment may need to be reviewed or revised.

4.8 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 Similar Exposure Groups (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 to relevant stakeholders.

4.9 Medical Surveillance

As pointed out in Art. 14 of the European Carcinogens and Mutagens Directive, all workers who are working in the concerned areas and are possibly exposed to formaldehyde shall have access to medical surveillance.

Formaldehyde metabolises quickly, so it does not accumulate in the body. This is the reason why a classic biomonitoring could not work for formaldehyde. Until now, no alternative method exists. The signatories will monitor this and provide advice to social partners regarding feasible concepts for the medical surveillance.

5. Settlement rules

If a disagreemeent appears during the implementation, the signatory parties shall try to find a solution which is in line with this agreement and in accordance with national traditions and settlement rules. If a national solution does not appear, the signatories at European level may be consulted.

6. Time schedule and Reporting

6.1 General

EPF and EFBWW members who implement this agreement during the course of this EU Social Dialogue WOOD Project are encouraged to inform the Project Leader of their experiences. This will preferably include the following minimum requirements:

- 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.

6.2 EPF members under the voluntary agreement

All EPF member companies falling under the autonomous 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:

- 2017-2018: Development of the European Action Guide on Formaldehyde and preparation of the implementation (Year 0);
- 2018: Finalisation and adoption of European Action Guide, dissemination to all member associations and affiliated companies and organisation of a European training workshop.
- 2019: Zone definition 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.

- 2020 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.

- 2021: EPF starts establishing a library of the implementation of the Action Guide

7. Implementation

This autonomous agreement is concluded for a three years duration unless signatories decide to renew it.

Where required by national rules and in accordance with established industrial relations, the agreement is valid at national level only when signed at European level and at the respective national level.

Signed on 29 November in Lisbon by:

Justin Daerden
Chairman Standing Committee Wood
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