

Proposed structure of the WPC BREF

Best Available Techniques Reference Document on Preservation of Wood and Wood products with Chemicals

PREFACE

SCOPE

1 GENERAL INFORMATION

Content:

- Brief introductory chapter to provide recent general information on the WPC sector addressed by the BREF in terms of numbers and size (production capacity) of installations, geographical distribution, production capacity and economics.
- Indication of key environmental issues for the sector, where possible, with some overall emission and consumption data (focusing on the key environmental issues) as background information.
- Other legislation relevant to the WPC sector (e.g. Directive 98/8/EC on biocidal products, Regulation (EU) No 528/2012 on biocidal products, Commission Directive 2001/90/EC on marketing and use of certain dangerous substances, Commission Directive 2011/71/EU on inclusion of Creosote in Annex I of Biocide Directive, Regulation (EC) No 1907/2006 'REACH', Commission Directive 2012/18/EU 'Seveso III' etc.)

1.1 General information on the sector

1.2 Wood preservation with water-based preservatives

1.3 Wood preservation with solvent-based preservatives

1.4 Wood preservation with creosote (oil-based) preservatives

1.5 Chemical wood modification

1.6 Hydrophobisation

2 APPLIED PROCESSES AND TECHNIQUES

Content:

- Brief description of the production processes currently applied in the industrial sector covered along with an indication of the techniques used to prevent and reduce emissions.
- Activities covered include the activities described in Annex I to IED and 'directly associated activities' (reference relevance of other BREFs to certain aspects of some 'associated activities').
- Presentation of sequential steps in a typical manufacturing unit and description of process variants, developing trends and alternative processes if relevant for the determination of BAT.

2.1 General

- Brief introduction to wood preservation and associated wood processing
- Different wood preservatives: water-based, solvent-based, creosote or chemicals used (details in 2.2 – 2.4 – 2.6)
- Different application techniques: non-pressure, pressure (details on application process in 2.9.1 – 2.9.2)
- Auxiliary / non-core processes (details in 2.7, 2.8, 2.10 – 2.13)

2.2 Wood preservation with water-based preservatives

- Description of preservatives used: boron salts (inorganic boron), CC-salts (chromium-copper compounds), CCB-salts (chromium-copper-boron compounds), quat salts (quaternary ammonium compounds), quat-boron formulations (with boron, and quaternary ammonium compounds), chromium-free copper formulations (Cu-boron, and Cu-HDO formulations, Cu, boron and triazole compounds, Cu-Quat) and formulations containing combinations of organic substances (for example, triazoles, pyrethroids carbamate);
- Main application processes: pressure process / full cell process, alternating pressure process; non-pressure / through impregnation, dipping
- Main products: when cleanliness and paintability of the treated wood are required. inside and outside timbers.

2.3 Wood preservation with solvent-based preservatives

- Description of preservatives used: organic active substances (insecticides and/or fungicides) in organic solvents (e.g. white spirit or other petroleum based hydrocarbons); synthetic pyrethroids are typically used as an insecticide, such as permethrin, bifenthrin or deltamethrin
- Main application processes: pressure process / double vacuum process
- Main products: when dimensional stability of product is required, e.g. windows and door joinery

2.4 Wood preservation with creosote / oil-based preservatives

- Description of preservatives used: impregnation oil (creosote) and emulsion concentrates based on impregnation oil (creosote); different grades of creosote (B and C)
- Main application processes: pressure process / Rueping, non-pressure / hot-cold bath treatment
- Main products: railway sleepers, utility poles, agricultural stakes without food contact, marinas; not to be used for residential, recreational and leisure facilities or agricultural structures where food or plants for consumption are grown.

2.5 Chemical wood modification (*optional*¹)

- acetylation, furfurylation, polymerisation
- Description of chemicals used: acetic acid anhydride (acetylation), furfuryl alcohol (furfurylation), sodium silicates (polymerisation)
- Treatment process: pressure impregnation process
- Main products:

2.6 Hydrophobisation (*optional*)

- Impregnation with hydrophobisation agents
- Description of chemicals used: oil, wax, paraffins, silicon compounds

2.7 Storage and handling of raw materials

- Wood, preservatives, auxiliaries (e.g. oil, grease, lubricants)
- Preparation of preservative mixtures

2.8 Preparation/Conditioning of Wood

Mechanical processing

- Debarking/ peeling
- Cutting, planning, drilling
- Bundling, piling

¹ Optional = coverage of process depends on the scale of application, i.e. if the relevant thresholds in Annex I of the Industrial Emission Directive are exceeded or not.

- **Conditioning** (adjustment of moisture content)
 - Seasoning/air drying yards
 - Steam conditioning / vapour drying
 - Boulton process/heating in solvent (boiling under vacuum)
 - Kiln drying

2.9 Preservative application processes

2.9.1 Non-pressure processes

- Brushing (*optional*)
- Spraying / Spray tunnel (*optional*)
- Deluging (*optional*)
- Dipping / Immersion
 - Brief dipping (*optional*)
 - Trough impregnation
 - Hot-Cold Bath Treatment

2.9.2 (High / Low) Pressure processes

High pressure

- Full cell process ('Bethell')/Vacuum-pressure process (plus variations)
- Empty cell process (variations: Lowry, Rueping process)
- Alternating pressure / modified alternating pressure

Low Pressure

- Double vacuum process

2.10 Fixation, drying and storing of treated wood/ wood products

2.11 Waste management

2.12 Water/Waste water management

3 CURRENT EMISSION AND CONSUMPTION LEVEL

Content:

- Presentation of the range of currently observed emission and consumption levels for the overall process and sub-processes along with an indication of the techniques used and information regarding production levels.
- Information includes currently observed usage of energy, water and raw materials and data on emissions of the key pollutants to air and water and the generation of residues/wastes arising from the activities as well as an indication of emissions of noise and odour, where relevant. In so far as the information is available, inputs to and outputs from sub-processes will be indicated, thus highlighting the more environmentally significant sub-processes and addressing options for the recycling and reuse of materials within the whole process or beyond. The information and data in this chapter provide the basis for assessing the key cross-media effects and interdependencies.
- Emission and consumption data presented in this chapter of the BREF will be qualified as far as possible with details on operating conditions (e.g. percentage of full capacity, inclusion or exclusion of other than normal operating conditions, reference conditions), sampling and analytical methods. Statistical presentations (e.g. showing average, maxima, minima, ranges) could be used for the purpose.

3.1 General

3.2 Wood preservation with water-based preservatives

Structured according to sequence of process steps

3.3 Wood preservation with solvent-based preservatives*Structured according to sequence of process steps***3.4 Wood preservation with creosote (oil-based) preservatives***Structured according to sequence of process steps***3.5 Chemical wood modification (optional)****3.6 Hydrophobisation (optional)****4 TECHNIQUES TO CONSIDER IN THE DETERMINATION OF BAT***Catalogue of techniques and associated monitoring used for:*

- preventing emissions to air, water (including groundwater) and soil or, where this is not practicable, for reducing emission,
- preventing or reducing waste generation,
- reducing the use of raw materials, water and energy,
- preventing or limiting the environmental consequences of accidents and incidents and site remediation measures; including measures taken to prevent or reduce pollution under other than normal operating conditions (such as start-up and shutdown operations, leaks, malfunctions, momentary stoppages and the definitive cessation of operations).
- Techniques include both the technology used and the way in which the installations are designed, built, maintained, operated and decommissioned.

4.1 General techniques common to all wood preservation activities

- Environmental management systems (EMS)
- Emergency plans for fire, accidental spills etc.
- Pre-operation baseline study/measures related to de-commissioning
- Appropriate design and layout of plant to prevent fugitive emissions, leaks and accidental spills (containment of treatment plant plus associated load/unloading areas, wood preservative storage area, holding area of treated timber etc.)
- Pressure-reducing valves for high-pressure pipes connected to mixing tanks
- Regular maintenance of installation and equipment
- Change to more efficient preservative application system
- Supercritical carbon dioxide preservation
- Thermal wood modification
- Substitution of potentially harmful preservative / chemical by less hazardous chemical
- Substitution of solvent-based preservatives or creosote by Low-VOC or VOC-free systems
- Control and optimized consumption of chemicals for the described end-use
- Measurement of wood moisture by electric resistance measurement or by weighing procedures (optimisation of impregnation process)
- Water recirculation (soil sealing and collection drip tray)
- Thermal post-combustion of process gases (coal-tar oil impregnation, solvent-based preservatives)

- Roof cover for drying, dripping and fixing areas
- Operational practices to eliminate spread of contamination by vehicle wheels or foot ware

4.2 Wood preservation with water-based preservatives

- Substitution of chromium containing protective products with chromium-free products
- Recirculation of water containing spills, drips or condensates to preservative mixture (closed circuit)
- Pressure process: minimisation of aerosols emissions by leaving sufficient time between pressure balance and opening of the boiler

4.3 Wood preservation with solvent-based preservatives

- Solvent management Plan
- Concentrated pesticide systems (solvent-based solutions with higher concentration of pesticides)
- Use of 'low' solvent systems or solvents with lower ozone-forming potential
- Replacement of solvent-based preservatives by water-based alternatives, thermal treatment or acetylation
- Enclosing the process, extract air and air abatement equipment: coalescing filter, thermal oxidiser (combustion), adsorption on carbon
- Solvent recovery and recycling system
- Application of double vacuum impregnation system (and solvent recovery)

4.4 Wood preservation with creosote (oil-based) preservatives

- Use of 'low emission' impregnating oils (Grade C)
- Replacement of creosote by water-based alternatives, thermal treatment or acetylation
- Treatment of condensates from depressurisation of treatment vessel and vacuum periods by activated carbon filter
- Hot-cold bath: closed impregnating system and suction of the emitted gases until the treated wood has reached the ambient temperature.
- Hot-cold bath: cleaning of collected gases through thermal post-combustion (thermal oxidiser) or by adsorption on activated carbon filters
- Switch to autoclave / pressure impregnation
- Fume extraction from autoclave / pressure impregnation and treatment by condenser, activated coal, combustion etc.
- Closed cooling system

4.5 Chemical wood modification (*optional*)

4.6 Hydrophobisation (*optional*)

4.7 Storage and handling of raw materials

Delivery, reception, storage and transport of untreated wood (raw material)

- Installation of noise walls and utilisation/optimisation of noise-absorbing effect of buildings
- Enclosure or partial enclosure of noisy operations
- Use of low noise vehicles transport systems
- Noise management measures

Delivery, reception, storage, mixing and transport of preservatives and other chemicals

- Proper design of storage and transport facilities
- Vapour balancing (decanting of impregnating oils/solvents)
- Vent vapour extraction and subsequent cleaning (decanting of impregnating oils/solvents)
- Submerged loading or bottom loading (decanting of impregnating oils/solvents)
- Storage of liquid organic substances in fixed-roof tanks connected to a gas collecting system or exhaust gas cleaning system
- Level, impervious, paved traffic ways in delivery area
- Adequately sized embankment/collecting tray/bunding for delivery, storage and mixing area
- Mixing of preservation fluid in closed system
- Automatic protection system against overfilling of storage tanks, mixing tanks and cylinders.
- Above-ground storage tanks: provide all-year-round heating or coating with the paint of a total heat reflectivity of at least 70%
- Underground storage tanks (existing): Lining with impermeable foil and equipped with a leachate warning system
- Treatment in a thermal oxidiser or equivalent emission control measures of exhaust gases released during inspection or cleaning of the storage tanks

4.8 Preparation /Conditioning of wood

Mechanical processing

- Enclosure or partial enclosure of mechanical wood processing (dust capture, particulate control system)

Kiln drying

- Noise reduction measures for fans
- Collection and treatment of condense water

4.9 Preservative application process

Non-pressure Processes

- Enclosure of spraying, spray tunnels, bath treatments
- Exhaust gas capture and cleaning system (Scrubber, activated carbon adsorber etc.)
- Sufficiently large and impervious to wood preservative solution drip tray, fender and automatic leak alarm device in the case of non-visible leakage,
- Double-wall impregnation tanks with leak alarm device
- Drip tray for single-wall impregnation tanks and automatic leak detection device in the case of non-visible drip tray

Pressure Processes

- Operational measures (sufficient time between depressurisation and opening of vessel)
- Application of final vacuum stage to remove excess preservatives
- Variable pump control (reduce energy consumption by using different pumps for creating and maintaining working pressure)
- Capture of exhaust gas during whole treatment process and cleaning system (thermal oxidiser, activated carbon adsorber)
- Discharge of exhaust gases from pressure relief valves and drain facilities into the gas collection system or feeding into exhaust gas treatment system
- Impervious drip tray or appropriate size collecting container placed on the floor of the installation and in the preservatives storage area

4.10 Fixating, Drying and Storing of treated wood/ wood product

- Removal of treated wood from preservation site only after fixation stage (minimum holding time)
- Fixation by steam (autoclave) or warm air (climate chamber) after preservation treatment
- Post-treatment in proximity to treatment
- Installation of drip tray
- Covered and/or contained and impermeable dripping area for freshly treated timber
- Open (roof-less) storage of treated wood with collection of leaching water

4.11 Waste minimisation/ Waste Management

- Separation of different waste streams at source
- Reuse, recycling and recovery of wastes
- Collection of preservative treated wood waste for proper recovery or disposal as hazardous waste
- Collection of preservative residues and sludges for proper disposal as hazardous waste
- Weather-protected and designated area for chemicals and hazardous wastes

4.12 Water / Waste water management

- Collection, treatment and recycling of wastewater streams and rain water from areas potentially contaminated by impregnating agents
- Separation of clean uncontaminated rain or surface water (diversion away from plant)
- Regular inspection, emptying and cleaning of oil separators, canals and sumps.

4.13 Monitoring

- Regular monitoring of waste water, surface run-off water and ground water
- Regular monitoring of post-combustion emissions
- Regular monitoring of VOC emissions from plant using organic solvents or creosote

5 BEST AVAILABLE TECHNIQUES (BAT) CONCLUSIONS

Content:

- *Conclusions on what BAT are for the sector based upon the information exchange as reflected in the previous chapters.*
- *Chapter includes also sections on: Scope, General considerations, Reference conditions, Definitions and acronyms and a brief description of the techniques so that that no substantial changes are needed for its inclusion into a document suitable to be adopted pursuant to Article 13(5) of Directive 2010/75/EU and used as ‘BAT conclusions’ as defined in Article 3(12) of Directive 2010/75/EU.*

Scope

General considerations

Reference conditions and averaging periods for emissions to air and water

Definitions and acronyms

- 5.1 General techniques to consider in the determination of BAT common to all wood preservation activities**
- 5.2 Wood preservation with water-based preservatives**
- 5.3 Wood preservation with solvent-based preservatives**
- 5.4 Wood preservation with creosote (oil-based) preservatives**
- 5.5 Wood modification (optional)**
- 5.6 Hydrophobisation (optional)**

6 EMERGING TECHNIQUES

6.1 General

6.2 Wood preservation with water-based preservatives

6.3 Wood preservation with solvent-based preservatives

6.4 Wood preservation with creosote (oil-based) preservatives

6.5 Wood modification (*optional*)

6.6 Hydrophobisation (*optional*)

7 CONCLUDING REMARKS AND RECOMMENDATIONS FOR FUTURE WORK

REFERENCES

GLOSSARY OF TERMS AND ABBREVIATIONS

ANNEXES