Position Paper

Brussels, October 2019

Creosote use in railways

CER aisbl – **COMMUNITY OF EUROPEAN RAILWAY AND INFRASTRUCTURE COMPANIES**
Avenue des Arts 53 – 1000 Bruxelles | T: +32 (0)2 213 08 70 | F: +32 (0)2 512 52 31 | @CER_railways | E: contact@cer.be | www.cer.be

Creosote use in railways

Summary

Under the provisions of the European Biocidal Products Regulation and the REACH Regulation the EU is currently evaluating the renewal of approval of the biocidal active substance creosote. In the context of this evaluation, the European railway infrastructure managers want to point out a number of important aspects regarding creosote use in railways.

- Risks related to the remaining uses of creosote in the railway sector are already properly managed.
- Creosote treated wooden sleepers are still necessary in a number of technical situations. Their extent may differ from one infrastructure manager to another depending on natural, historical and operational characteristics.
- Infrastructure managers are committed to further reduce WEI-type B and C creosote usage[1].
- A range of sustainable alternative products have not yet achieved the necessary market and technical maturity. Infrastructure managers expect the chemical industry to further develop these alternatives over the next five years.
- The next approval of creosote will help infrastructure managers to work with industry to extensively test such environmentally friendly alternative solutions to substitute creosote without hampering competitiveness of the whole rail system. The approval would also guarantee infrastructure managers only use creosote for the purposes of maintaining and preserving existing service on critical track sections with wooden sleepers.

[1] WEI-type C creosote is the less toxic available in the market with lower amounts of light polycyclic hydrocarbons than types A and B. Use of WEI-type C creosote instead of type-B means 20% less biocide, less odour and negligible amounts of naphthalene.

1. Background

The Biocidal Products Regulation[2] and the REACH Regulation[3] regulate the placing on the market and use of creosote, a wood preservative for industrial and professional use in applications above soil, in soil and freshwater, and in sea water. The authorisation of creosote-based products is the responsibility of Member States and creosote was approved for railway use until 29 March 2021. The procedure for the potential renewal of approval of creosote as the active substance is currently ongoing.

2. Risks related to the remaining uses of creosote in the railway sector are properly managed

Creosote has been used in the rail industry since the early days to protect wooden sleepers and therefore extend their lifetime by 10 to 30 years, depending on the wood and the degree of impregnation. European railway infrastructure managers (IMs) are aware of the negative external effects of creosote and therefore progressively replacing creosote impregnated wood by alternative materials.[4]

The risks related to creosote use are currently known and managed to reduce the level of risk to acceptable levels:

- A small part of the creosote present in the sleepers is eliminated throughout their life by volatilisation, leaching or biodegradation during the first two years therefore pose no major environmental risk.
- It is notably the levels of naphthalene (toxic) and benzo(a)pyrene (carcinogen) that make creosote dangerous to humans. Creosote is carcinogenic only through direct and frequent contact with the skin.
- The production as well as the installation and removal of the creosoted sleepers are strictly governed by national standards. Compliance with the rules on protective equipment for sleepers handling is necessary. Occupational safety is guaranteed through personal adapted protective equipment (PPE).
- Studies, performed by independent experts, assess the impact of creosoted wooden sleepers on ballasts, soils, groundwater and surface water, air, soil gases. For environmental impact, these studies conclude that:[5]
    - Soils and sediments: moderate impact limited to maximum 10 cm around the sleepers
    - Surface and ground water: very low impact[6]
    - Ground gas: no impact
    - Air: impact limited right on sleeper piles. No impact few meters away.
- There are a number of specific disposal procedures that ensure that used sleepers removed from service are appropriately recycled and not repurposed after removal with proper storage handling and end-of-life treatment.

[2] Regulation (EU) No 528/2012 https://eur-lex.europa.eu/eli/reg/2012/528/oj
[3] Regulation (EC) No 1907/2006 https://echa.europa.eu/regulations/reach/legislation
[4] Sustainable Wooden railway Sleepers, UIC Report, 2012
https://www.shop-etf.com/en/suwos-sustainable-wooden-railway-sleepers
[5] Cargouët, M., Jeannee, N., Vidart, B. et al. Environ Sci Pollut Res (2018) 25: 17409
https://doi.org/10.1007/s11356-018-1910-9
[6] Schwellenfreilager BTC, Hägendorf Untersuchungen SBB/Sieber Cassina + Partner AG, 2017
Report available upon request

- Furthermore, several actions have been implemented by the wood treatment industry to reduce creosote consumption and to improve impregnation avoiding creosoted sleepers leakage, such as:
  - Reducing dangerous components;
  - Improving quality of wood reducing sapwood quantity and increasing drying rate;
  - Optimising the impregnation process like preheating wood before winter treatment, heated pipes and tanks heated to keep them at 40 degrees Celsius.

3. Wooden sleepers are still used in few cases where there is no viable replacement solution yet

Concrete sleepers have been widely used by the IMs to replace the creosote wooden sleepers.[7] However, there are a few number of technical situations where wooden sleepers are still needed:

- Custom-made sleepers in some localized areas:
  - Old tunnels or platforms where the necessary height to install concrete sleepers is not available to preserve current/needed track loading gauge profile or other height restraints (e.g. catenary);
  - Specific supports on metal bridges with direct and indirect fastenings;
  - Switches and crossings (the laying of which needs a greater flexibility, and sleepers laid in between these, in order to guarantee the homogeneity of the laying;
- In stations, yards and industrial lines, where the use of wooden sleepers could in some cases be more recommended because of their mechanical behaviour.
- Situations where track assets might receive vertical extreme shocks and excessive forces.
- When the ballast layer is not thick enough and/or the substructure is unstable.
- Small jointed radius curves (gauge widening).
- To maintain homogeneity track profile in sections that have already wooden sleepers and where there is no technical need to replace all sleepers of this line.
- In transition zones close to singular points like level crossings, dilatation joints etc. which are not compatible with concrete sleepers.
- Structures where total weight load is heavily restricted.
- Shunting tracks, where wagons are coupled and drag shoe is used.

It has to be noted that replacing a wooden sleeper by a concrete is not straight forward through an ordinary maintenance operation but instead requires a renewal operation. This poses an economic constraint for secondary tracks and low traffic density lines, which are not scheduled for renewal.[8]

The railway sector is also aware of the environmental footprint of alternative sleepers including concrete sleepers, which are carbon-intensive and energy-consuming both in the

[7] Manalo, A., Aravinthan, T., Karunasena, W. et al. Composite Structures (2010) 92: 603 https://doi.org/10.1016/j.compstruct.2009.08.046
[8] UIC 7-9-line categories according to UIC Leaflet 714 https://www.shop-etf.com/en/classification-of-lines-for-the-purpose-of-track-maintenance

production and installation process. IMs perform socio-economic and environmental analysis before any replacement of wooden sleepers.

4. There is ongoing research on alternatives to creosote treated wooden sleepers

IMs remain committed in developing extensive research on potential substitutes to creosote which are less impacting to the environment and to the human health. Various tests are done on:

- Alternative solutions to creosote for wooden sleepers treatment such as tests with copper salts, copper naphthene (in both cases usually mixed in oil-based solutions and/or water-based solutions).
- Tall oil
- Tuned concrete sleepers (concrete sleepers, of which the vertical stiffness is reduced in order to be compatible with wooden sleepers by pre-cracking it in the transverse direction of the sleeper).
- Polymer or composite sleepers.
- Untreated wood: beech, oak, pine and tropical types of wood such as azobe trees (tropical wood is a suitable alternative if originates from sustainable forestry and comply with transparent carbon accounting).

The afore-mentioned alternative solutions to creosote can have technical characteristics similar to those of creosote-treated wooden sleepers, however, their final behaviour regarding environmental and health safety, end-of-life management and chemical composition is still unknown or contains risks.[9]

Moreover, many alternative products are not market-ready yet. European Union's Horizon 2020-funded ERA-LEARN project (CreoSub) is developing alternative protection technology that shows a better health and safety profile than creosote. Nevertheless, and according to the project's outlook, long-term performance of the tested preservative systems[10] might not live up to expectations or that the product turns out to be economically not viable.[11]

In order to investigate the feasibility of alternatives to creosote sleepers, IMs and railway companies collaborate in extensive research programmes such as, "Alternative Treatments to Creosote Use and Woods Types for Wooden Sleepers (AT-WOOD)", coordinated by UIC.

5. Phasing out creosote in the railway sector

IMs are willing to take up their responsibility concerning further reducing creosote type B and C. In this regard, IMs closely collaborate with each other in various research programs to explore viable alternatives. It is essential for IMs to continue their extensive research in finding alternatives to creosote. EU funding and incentives can help improve the characteristics of sleepers concerning their durability, maintenance and ease of recycling.

[9] For example, impregnation with a copper-based preservative might be related to another possible toxic impact if not properly handled/performed. Copper is a substance with properties such as toxic to aquatic life.
[10] Tested preservative systems of Creosub are Crude tall oil (CTO) and impregnation with a copper-based preservative followed by vacuum drying in oil, among others.
[11] Hundhausen, U., Mahnert, K., Bollmus, S. et al. (2014). CreoSub: New protection technology to substitute creosote in Railway sleepers, timber bridges and utility poles
https://www.researchgate.net/publication/329217090

Due to the economic consequences and technical circumstances applicable to railway networks a ban on the use of creosote may have on the railway sector, CER call on the European Commission to take note of the railway's approach in creosote use and IMs' strategies in gradually phasing out the substance.

The next approval of creosote will help IMs to continue their work with the chemical industry to come forward with acceptable alternatives with market maturity to substitute creosote without hampering competitiveness of the whole rail system. This approval would also guarantee IMs to only use creosote for the purposes of maintaining and preserving existing service on critical track sections with wooden sleepers.

About CER
The Community of European Railway and Infrastructure Companies (CER) brings together railway undertakings, their national associations as well as infrastructure managers and vehicle leasing companies. The membership is made up of long-established bodies, new entrants and both private and public enterprises, representing 71% of the rail network length, 76% of the rail freight business and about 92% of rail passenger operations in EU, EFTA and EU accession countries. CER represents the interests of its members towards EU policy makers and transport stakeholders, advocating rail as the backbone of a competitive and sustainable transport system in Europe. For more information, visit www.cer.be or follow @CER_railways on Twitter.

This CER document is for public information.
Although every effort is made to ensure the accuracy of the information in this document, CER cannot be held responsible for any information from external sources, technical inaccuracies, typographical errors or other errors herein. Information and links may have changed without notice.