

Technical Factsheets Construction & Demolition Waste

Tar Containing Asphalt

Recycling of asphalt is successful in several EU countries. A main issue is the presence of tar, a material containing dangerous polycyclic aromatic hydrocarbons (PAH). Environmentally sound recycling includes the separation of tar containing asphalt and safe disposal of it.

About tar containing asphalt

Asphalt is a mixture of sand, aggregates, filler and bitumen. Besides bitumen, tar and tarproducts have been used in Europe as binder in asphalt until roughly the 1990'ies. Sometimes both bitumen and tar were used together (tarbitumen). Tar contains PAH in high concentrations. PAH are known to be carcinogenic. Tar is a residue of coal, whereas bitumen is a residual fraction of the refinery of oil. PAH concentrations in tar are 1,000 – 10,000 times higher than in bitumen.

There is no European wide definition of tar containing asphalt (TCA). Per Member State there may be different views what TCA is or when asphalt has to be considered hazardous. (TCA) is a waste for which two codes of the European List of Waste can be used:

- 17.03.01 * (bituminous mixtures containing coal tar)
- 17.03.02 (bituminous mixtures other than those mentioned in 17.03.01)

Category 17.03.01 concerns hazardous waste. Asphalt waste is considered a hazardous waste when the concentration of coal tar exceeds 0.1% (w/w), or: 1,000 mg/kg. Coal tar as such can not be analysed. In line with CLP regulation benzo(a)pyrene can be used as a marker compound. When the concentration of benzo(a)pyrene exceeds 50 mg/kg a waste must be considered to be hazardous.

The European Regulation on Shipment of Waste considers asphalt with >50 mg/kg benzo(a)pyrene as potential risk, when transported internationally. When these materials are exported, a more extensive administrative procedure is required.

Dealing with TCA in practice

During road building activities (reconstruction, demolition) TCA should be separately removed and stored. If TCA gets mixed up with (bituminous) asphalt, recycling is put at risk. TCA is not easily distinguished from bituminous asphalt purely by its appearance. Experienced workers can recognize tar by the shiny appearance and the typical smell. A more safe, objective and practical solution is to use a proper PAH marker device. A piece of asphalt is sprayed with a white liquid, the PAH will dissolve in the marker liquid and upon turning brown/yellow the presence of PAH is confirmed. The detection limit of a PAH marker is about 250 mg/kg. This method does not analyse the exact concentration, it gives a pass/fail answer. In practice it is supposed that when PAH is demonstrated with the marker device the waste is hazardous.

A PAH marker can be used to control pavement milling so that TCA and bituminous asphalt are removed separately. Also after works are completed, a PAH marker can be used to assess individual batches either at the site or at the gate of a recycling plant.

In several Member States TCA is not separately managed. This can be specifically the case when asphalt recycling is at a low level. Asphalt is for instance reused at a construction site by crushing or milling and then mixing in-place with cement and or sand (a “cold technique”). Such solutions keep TCA in the environment, whereas some Member States have the policy of removing tar from the material chains. Hot recycling into new asphalt should not be done with TCA, as this leads to emissions of PAH and health risks for asphalt workers.

Case examples in the EU

The Netherlands

Asphalt is considered TCA when PAH exceeds 75 mg/kg. It is obliged to separate at source TCA from other asphalt. A guideline (“Managing asphalt waste arisings”) describes the protocols for stakeholders to manage TCA in each step in the chain. It provides for methods of surveying an asphalt construction, reporting and preparation of demolition works. The following activities must be performed:

- The road owner is responsible
- Historical research
- Field inspection, partly random sampling
- Sampling according to sampling requirements
- Selection of contaminated layers
- Laboratory confirmation for instance by DLC or HPLC
- Reporting of investigations
- Drafting of selective demolition / milling plan

TCA is not allowed to be landfilled. The minimum treatment operation to be carried out is thermal treatment and recycling of inert material. The Netherlands counts three operators of treatment plants permitted to process TCA. Tar actually serves as a fuel for the process which produces good quality aggregates.

Recyclers of C&DW receive asphalt which undergoes a crushing process. Such recyclers have no permit to process TCA, only to store it temporarily. Acceptance procedures are strict and TCA is stored separately before sending to a thermal process. Waste acceptance is based on inspection of delivered data, visual inspection and use of a PAH marker.

Current waste arisings amount to some 1,000,000 tpa of which some 95% remains as sand, gravel and filler for recycling.

Belgium (Flanders)

TCA as such is not described in Flanders, this material is referred to as PAH-containing asphalt. Asphalt is considered hazardous when PAH is demonstrated using a PAH marker device. During demolition works bituminous asphalt and TCA are separated based on this distinction. For demolition works a guidance is available.

TCA may not be reused through hot recycling. Crushed TCA may be used until May 2019 in cold applications mixed with sand and cement. The application must be larger than 1.500 m³. Inspection of works is required, but there is no clarity how this must work in practice. As a result TCA is “buried” under roads throughout the country and will return after the end of life of roads. After May 2019 TCA must be processed thermally to eliminate tar.

Germany

In Germany each federal state (Bundesland) follows its own regulations concerning the qualification of TCA. For example in North-Rhine Westphalia asphalt is considered hazardous waste when PAH exceeds 1,000 mg/kg, in Hesse when PAH exceeds 400 mg/kg and in Lower Saxony when PAH exceeds 25 mg/kg. Therefore the destination of TCA varies per federal state.

In Germany the annual amount of 170301* is about 2.6 million tonnes, of which about 750,000 tpa are reused in road construction using “cold techniques”. Large quantities are destined for landfill where the biggest part is used for construction and maintenance. Only small quantities go to thermal treatment.

Cold technique recycling into public roads will be prohibited as of January 2019. Future development might be a general prohibition of cold techniques. This means that large volumes must be recycled in another way. Thermal treatment plants for TCA are not available in Germany, however there is a substantial demand for construction materials in landfills. Due to legal regulations, it is best practice to use TCA as secondary mineral material in such applications as landfill construction and maintenance.