Directive 2005/69/EC and testing as per IP 346 and ISO 21461

Highly aromatic oils (DAE, Distillate aromatic extract oils) have traditionally been used in tyres because of their compatibility, with natural and synthetic rubbers, and low market prices. Such oils contain Polycyclic-aromatic hydrocarbons (PAHs), some of which have shown to be carcinogenic. Oils known to contain PAHs therefore require risk and safety labelling and processes likely to release PAHs into the environment should be controlled and avoided.

One such process is the use of extender oils in tyre compounds. In the tread compound the oil is also an essential component for the technical performance of the tyre, in particular for its road adherence (or grip) properties and wear and endurance characteristics.

In 2005, the European Commission adopted a Directive restricting the marketing and use of certain PAHs in extender oils used in tyre production. Tyres produced after 1 January 2010 have to comply with the requirements of the Directive, which means that if they contain extender oils exceeding the limits specified in the Directive, the products can not be sold in the european markets.

According to the Directive, vulcanised rubber compounds used in the production of tyres or tyre parts marketed to European Union (EU) should contain less than 0.35% of Bay Region Hydrogens (Hbay) as measured and calculated by ISO 21461. The limitations for Benzo(a)pyrene and the sum of all listed PAHs are regarded as maintained. Natural rubber reclaim and Butyl reclaim, both from Rubber Resources, should meet the specifications in the Directive.

The Directive also provides a list of 8 different PAHs which the EU has classified as carcinogenic:

1. Benzo(a)pyrene (BaP) CAS No 50-32-8
2. Benzo(e)pyrene (BeP) CAS No 192-97-2
3. Benzo(a)anthracene (BaA) CAS No 56-55-3
4. Chrysene (CHR) CAS No 218-01-9
5. Benzo(b)fluoranthene (BbFA) CAS No 205-99-2
6. Benzo(j)fluoranthene (BjFA) CAS No 205-82-3
7. Benzo(k)fluoranthene (BkFA) CAS No 207-08-9
8. Dibenz(a,h)anthracene (DBAhA) CAS No 53-70-3

Benzo(a)pyrene (BaP), is proposed as a qualitative and quantitative marker for the presence of other PAHs.

Extender oils may not be used for the production of tyres if they contain

- > 1 mg/kg BaP
- > 10 mg/kg of the sum of all listed PAHs.

These limits are regarded as maintained, if the polycyclic aromatics extract is less than 3% by mass, as measured by standard method IP346.

Currently two alternative oils are available which meet the requirements of the Directive 2005/69/EC: MES (Mild extract solvates) and TDAE (Treated distillate aromatic extracts).

What TÜVRheinland can offer?

We offer complete analytical solution to evaluate the extender oils and tyres as per

- IP346 to determine the level of polycyclic aromatics in unused oils.
- ISO 21461 to determine the level of aromaticity of oil in vulcanised rubber compounds

Our other services to tyre Industries are

- REACH SVHC testing
- E-Marking and
- CMR substance screening

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