eurobitume

Recommended Terminology for Biomaterials in Bituminous Binders

Contents

ISBN: 978-2-39068-086-4
D/2025/7512/197

Published by the European Bitumen Association
Boulevard du Souverain 165
B - 1160 Brussels, Belgium
www.eurobitume.eu

Eurobitume, September 2025, info@eurobitume.eu

1 Introduction

In recent years, there has been increasing interest in incorporating non-petroleum products into bitumen and bituminous binders. Many of these materials are of natural origin (i.e. they are sourced from plant or animal species) and have been described as biomaterials or biogenic materials. Others may be generated from waste streams, such as waste food or used cooking oils. Eurobitume established TF Biomaterials to address the use of biomaterials in bitumen and bituminous binders. A key deliverable for the Task Force is the production of a clear terminology document for use by Eurobitume members and key stakeholders. The terms described in this document are the most commonly used in the industry. The use of biomaterials in bitumen is developing at a rapid pace, with many new materials being evaluated. This document reflects the state of the art at the time of publication.

Eurobitume recommends that the terms defined in this document are used when discussing biomaterials and bituminous products containing biomaterials. There is currently significant variation in the terms used to describe products across both the bitumen and biomaterials industries and this is evolving rapidly. The use of bio-based products is increasingly addressed in research or technical developments, but even more so in the public domain, including media or for marketing purposes. Eurobitume applies a strictly science-based approach and does not promote any application or product for which the same terminology may have been or is used. The terminology set out in this document reflects the opinions of Eurobitume members on terms to be used.

This document focusses entirely on terminology. Other considerations for biomaterials, such as source or competition with the food chain are discussed in other Eurobitume documents.

> Note: There are several very generic terms in common use (e.g. bio-binder, bio-based binder) but these do not give any indication of application or intended use.
>
> In this document, the term “binder” refers to bitumen and bituminous binders

2 Terminology

Biomaterial [1]

Material typically derived from organisms such as plants or animal sources, after appropriate treatment. Some biomaterials may be derived from waste streams such as food waste or used cooking oil.

Biomass [2, 3]

Organic matter typically from plant or animal sources. Material of biological origin excluding material embedded in geological formations and/or fossilised.

Bio-based material [3]

Material incorporating biomaterial in its composition.

Biogenic component [2]

Component derived or produced from biomass.

Bio-binder [4]

Binder containing bio-based material. This generic term gives no indication of the biomaterial content.

Bio-based binder [4]

Binder in which a proportion of bitumen is replaced by bio-based material. This generic term gives no indication of the biomaterial content.

> Note: it is recognised that the terms “bio-binder” and “bio-based binder” are frequently used interchangeably. However, Eurobitume recommends the use of the term “bio-based binder” as this gives a more accurate description of the material.

Bio-replacement binder (direct alternative) [5, 6]

Binder in which more than 75% of the bitumen is replaced by bio-based material.

Bio-extended binder [5, 6]

Binder in which 10 – 75 % of bitumen is typically replaced by bio-based material.

Bio-modified binder [5, 6]

Binder in which less than 10 % of bitumen is typically replaced by bio-based material.

Note: Other concentration-based classifications have been proposed to those given in sections 7-9 above. [7]

Bio-based polymer modified bitumen

Polymer modified bitumen wholly or partially containing bio-based material in its composition.

Bio-cut-back bitumen

Bitumen or bio-binder containing a volatile oil which is derived from biomass.

Bio-fluxed bitumen [4]

Bitumen or bio-binder material in which the viscosity is reduced by the addition of a flux derived from biomass.

Bio-rejuvenator

Bio-based material which is claimed to restore the properties of aged bitumen in asphalt.

Renewable material [2]

Material that is composed of biomass and can be continually replenished.

Bio-oil

Oil derived from biomass sources. Bio-oils should not be confused with, for example, vegetal-oils.

Biopolymer [2,8]

a. Synthetic

   Polymer produced synthetically from microbial fermentation or biomass, examples include polylactic acid and polyglycolic acid.

b. Natural

   Polymer obtained directly from plant sources e.g. cellulose, chitosan, agar and natural rubber.

Bio-additive

Generic term used to describe a material of biomass origin which can be added to bitumen to modify performance, handling or sustainability criteria.

Plant-based bio-binder

Binder in which the bio-based component is derived from plant species.

Wood-based bio-binder

Binder in which the biogenic component is derived from trees.

Bio-certified material binder [9]

Material certified by a specific scheme that part of the feedstock is derived from biomass. Most often the certification is made via a mass-balance approach.

External references

1. Williams D.F., Definitions in Biomaterials. Proceedings of a Consensus Conference of the European Society for Biomaterials, ISBN 978-0-44-442858-5, 1987
2. EN 16575:2014 Bio-based products – Vocabulary
3. Vert M. et al., Terminology for biorelated polymers and applications (IUPAC recoomendations 2012), Pure & Applied Chemistry 84 (2), 2012
4. EN 12597:2024 Bitumens and bituminous binders – Terminology
5. Peralta, J., Raouf, M.A., et al., Bio-Renewable Asphalt Modifiers and Asphalt Substitutes. In K. Gopalakrishnan et al., ed. Sustainable Bioenergy and Bioproducts. Green Energy and Technology, 2012
6. Espinosa, L., Gadler, F., et al., Multi-scale study of bio-binder mixtures as surface layer: Laboratory evaluation and field application and monitoring. Construction and Building Materials 287 (7), 2021
7. Porot L., Chailleux E., et al., Complex bituminous binders, are current test methods suitable for? Proceedings of the RILEM International Symposium on Bituminous Materials, ISBM 2020, RILEM Bookseries, vol 27, 2020
8. EN 17228:2019 Plastics - Bio-based polymers, plastics, and plastics products - Terminology, characteristics and communication
9. The Carbon Trust: Meet customer calls for lower carbon products through a mass balance approach.