

1. Introduction

Bitumen road emulsions are water based road construction products in which the dispersed phase is bitumen. Bitumen itself is a virtually involatile, adhesive and waterproofing material derived from crude petroleum and is very viscous or nearly solid at ambient temperature [1]. It is emulsified in water by processing with various surface active additives and other chemicals to decrease its viscosity. This is to enable application in road surfacing at a lower temperature than otherwise would be possible. On application, the water phase of the emulsion is naturally removed by absorption on the road surface or evaporation, leaving behind a residual bituminous binder. There are two major types of bitumen emulsion depending on the chemical structure of the surface active additives. These are known as Cationic (supplied to BS EN 13808) [2] and Anionic (supplied to BS 434-1) [3].

2. Safety Health and Environment

Bitumen in service as a road surfacing material is not known to present any safety, health or environmental hazard [4] and its use for this purpose is permitted and registered under EU chemical safety legislation [5]. Suppliers of bitumen emulsions must provide Material Safety Data Sheets detailing any additional safety, health or environmental hazards brought about as a result of emulsification of the bitumen and its subsequent application. Emulsions are non-flammable, although the dried bituminous film will support combustion. Depending on the particular use, they may be applied at various temperatures above freezing, ranging from ambient, where there is no additional hazard due to temperature, up to a maximum of 90°C. At elevated temperatures, additional precautions should be taken to avoid scalding.

Emulsions should never be heated above 90°C to avoid the possibility of boiling and hazardous spillage due to vigorous frothing. Also, heating in excess of 90°C or for prolonged periods at lower temperature can damage emulsions, changing their application properties. Similarly, emulsions should be protected from freezing to avoid damaging them.

If emulsions come into contact with hot bitumen above 100°C, there is a significant risk of spillage due to rapid expansion of the boiling mixture. Where it is necessary to change the use of a storage tank from an emulsion to bitumen or vice versa, advice should be sought from the bitumen and emulsion suppliers. Care should also be taken to ensure that cationic and anionic emulsions are never mixed as they are chemically incompatible and will coagulate one another rendering themselves unusable.

Eyes should be protected from splashes of emulsion by the use of safe working practices and wearing suitable goggles or visors. If the eyes are accidentally splashed with emulsion, they should be irrigated thoroughly with cold water for at least 5 minutes and urgent medical advice sought.

Scalds should be immediately plunged under cold running water and held there for at least 10 minutes or until thoroughly cold. No attempt should be made to remove cold bitumen

which has adhered to the skin unless circulation is impeded and medical advice should be sought [6].

Contact of bitumen emulsion with the skin should be avoided by the use of safe working practices and personal protective equipment including protective clothing, impermeable gloves and boots. Barrier creams, particularly of the water repellent type, are beneficial. Immediately after work, personnel should use a skin cleaner and wash thoroughly with soap and water. Solvents should not be used for the removal of residual bituminous binder from the skin since they may themselves cause irritation.

There is a requirement under EU legislation [7] to assess any release of any regulated dangerous substances to the environment in service from all construction products including bitumen emulsion bound road surfacing. However, the appropriate test methodology to be used for this purpose is still currently under consideration by the appropriate EU standardisation body and will be adopted for bitumen emulsion bound road surfacing when finalised.

3. Transportation

The Chemical Industries Association 'Black and White' marking scheme advice should be followed for signing of delivery vehicles, mobile storage tanks and mobile application plant [8].

4. Storage in Bulk

The Road Emulsion Association publishes a Code of Good Practice for the Use and Safety of Mobile Storage Tanks [9] and the advice in this publication should be followed particularly in relation to siting, receipt of deliveries, heating, circulation and storage of bitumen emulsions.

5. Storage in Drums and packs

Bitumen emulsions have a limited shelf life depending on the specific formulation and storage conditions and it is important to rotate stock to ensure that older drums and packs are used first.

Generally, drums and packs in storage should be re-homogenised by rolling / inverting periodically to minimise any gradual separation of the bitumen phase. This should also be done immediately before use to re-homogenise any separation that may have occurred. Drums and packs should be protected from frost and also high temperatures, which could cause pressurisation of the container.

6. Waste Disposal

Depending on the formulation, bitumen emulsions and the container they have been stored in may be classified as either non-hazardous or hazardous waste and both must be disposed of in compliance with relevant legislation. Reference should be made to the supplier's Material Safety Data Sheet for detailed information.

References

- [1] BS EN 12597:2024 Bitumen and bituminous binders - Terminology
- [2] BS EN 13808:2013 Bitumen and bituminous binders - Framework for specifying cationic bitumen emulsions
- [3] BS 434-1:2011+A1:2016 Bitumen road emulsions - Specification for anionic bitumen road emulsions
- [4] www.eurobitume.eu/hse
- [5] EC1907/2006 Registration, Evaluation, Authorisation and Restriction of Chemical Substances
- [6] European Bitumen Association: Notes for Guidance of First Aid and Medical Personnel
- [7] 305/2011/EU Construction Products Regulation 3
- [8] Chemical Industries Association: Road Tankers Black and White Marking Scheme ISBN 1 85897 097 0
- [9] Road Emulsion Association: Code of Good Practice for the Use and Safety of Mobile Storage Tanks

For further information on all REA Technical Data sheets please look on the “Technical Datasheets” webpage on www.rea.org.uk

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