

# Fact sheet on mastic asphalt

## HEALTH AND SAFETY

The information in this sheet covers all grades of mastic asphalt manufactured and sold. This includes grades supplied in solid block form and molten "hot charge" form.

## INTENDED USE

Asphalting is one of the recognised specialist trades in the building industry and the type of asphalt primarily applied to buildings is known as mastic asphalt. Unlike other types of asphalt, mastic asphalt is laid without compaction, normally by means of a hand float. It is used to waterproof basements and roofs and for the lining of tanks to contain water or weak industrial liquors. It is also extensively used to provide waterproof and hard wearing surfaces to balconies, roof top car parks and service decks and domestic and industrial floors. Mastic asphalt products are sold to the trade for these applications and it is assumed that customers will be familiar with normal trade practices concerning these applications. This would include knowledge of relevant Codes of Practice such as British Standard Code of Practice for Mastic Asphalt Roofing BS8218:1998.

## COMPOSITION

The materials used in manufacturing mastic asphalt include:

- 1) Asphaltic cement which consists of bitumen, lake asphalt, asphaltite or blends of these with one another or with flux oils
- 2) Fine aggregate. This will be a naturally occurring consolidated stratified calcareous rock
- 3) The coarse aggregate consists of clean igneous or calcareous rock or siliceous material obtained from natural deposits either directly or by screening, crushing or other mechanical process
- 4) Certain grades of mastic asphalt are polymer modified and some may include colouring pigments. Proprietary products are used for these purposes.

The bitumen essentially contains hydrocarbons and their derivatives and is soluble in carbon disulphide. It is substantially non-volatile and softens when heated. It is brown/black in colour and, apart from the Trinidad Lake Asphalt, it is obtained from a refinery process from petroleum. The composition is best described by separation into broad chemical components as follows:

- 1) Asphaltenes - brown/black amorphous solids containing mainly carbon and hydrogen and also nitrogen, sulphur and oxygen. They are aromatic materials of high molecular weight, typically 2,000 to 5,000
- 2) Resins - adhesive, solid or semi-solid, dark brown in colour and very polar in nature, containing mainly carbon and hydrogen and small amounts of nitrogen, sulphur and oxygen. Molecular weight typically 900 - 1,300
- 3) Cyclics - viscous liquids comprising largely carbon and hydrogen, but also some sulphur, nitrogen and oxygen. Their molecular weights are typically 550 - 850

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Saturates - solid or viscous liquids, straw to white in colour, consisting substantially of hydrocarbons of molecular weight 500 – 800. Straight chained, branch chained or alkyl aromatics where the alkyl chain is long. Cyclic paraffins (naphthenes) also occur in this fraction. The saturates that are solid at ambient or low temperatures have appreciable wax contents.

## HEALTH HAZARDS

As supplied in block form the products do not represent any significant risk to health. The surfaces of the blocks may retain a dusting of fine crushed limestone from the manufacturing process. There is a Workplace Exposure Limit for this dust (10mg/m<sup>3</sup> total inhalable dust and 5mg/m<sup>3</sup> for respirable dust) but significant airborne dust is unlikely in normal conditions of use. If unusual circumstances should result in airborne dust, then appropriate respiratory protection should be worn. When heated, mastic asphalt gives off bitumen fume which can contain polycyclic aromatic compounds but these are of high molecular weight and boiling point and are more complex ring systems than those considered to be a potential carcinogenic hazard. Recent reports have concluded from the available information, knowledge and experience that:

- 1) Bitumens are of a low order of acute toxicity
- 2) There is no evidence from animal tests or human experience that bitumens are associated with long term effects in man resulting from normal use over extended periods.

The Health and Safety Commission has not established an approved Workplace Exposure Limit for bitumen fume. However, the American Conference of Government Industrial Hygienists has adopted a threshold limit value for bitumen fumes for an 8 hour time weighted average of 5 mg/m<sup>3</sup> and it is recommended that exposures are controlled below this figure. A survey of studies has concluded that inhalation exposure of polycyclic aromatic compounds during handling and use of bitumens will be extremely low if total fume exposures are kept below 5 mg/m<sup>3</sup>.

## PRECAUTIONS IN HANDLING AND USE

- a) Block form

When mastic asphalt is supplied on pallets it should be noted that pallets and strapping are not sufficient for safe crane handling. Special purpose lifting tackle and caging or netting are required to form part of the operation in accordance with current safety requirements. Blocks should be transported in high sided vehicles or netted. Where tension strapping is used on pallets, eye protection to British Standards BS EN 166:2002 should be worn when removing the tension strapping due to risk of 'whiplash' injuries. A similar grade of eye protection should be worn when blocks are broken prior to melting. The use of hammers to break blocks can result in small fragments flying off, particularly in cold weather.

- b) 'Hot charge' form

Hot charge mastic asphalt is delivered at a maximum temperature of 230°C. Consequently the major hazard is that of skin burns. Exposed areas of skin should be reduced to the minimum and heat resistant gloves and eye protection to British Standard BS EN 166:2002 should be worn where splashing is foreseeable. If hot charge material is transported in the

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customer's own vehicle, care should be taken to ensure that the vehicle complies with current road transport legislation including the Motor Vehicle Construction and Use Regulations.

c) General Precautions

Heating and melting should be carried out to the agreed procedures under the Working Rule Agreement. Temperatures should never exceed 230°C specified in BS8218:1998. Excessive fume generation results when the material is overheated. If mastic asphalt is to be applied in a confined situation, potential exposure to bitumen fume will be higher and adequate ventilation should be provided and suitable respiratory protection worn.

## FIRST AID

**Skin contact:** In the event of accidental skin contact with hot asphalt the injured part of the body should be immediately plunged under running cold water. Once the material has cooled it will do no further harm. Small amounts of residual asphalt adhering to the skin may be removed carefully with liberal amounts of petroleum jelly. Medical advice should be sought in all cases of serious burns from hot asphalt.

**Eyes:** If hot asphalt is splashed into eyes it should be cooled immediately under cold running water for at least 5 minutes. Medical advice should be obtained.

**Inhalation:** First-aid treatment for inhalation during normal intended use of this product is unlikely. If in doubt seek medical advice.

**Storage:** There are no special storage requirements but good industrial practice and housekeeping should be observed in areas where mastic asphalt is stored in block form.

## REFERENCES AND FURTHER INFORMATION

- 1) CONCAWE report No. 7/82 - Health aspects of bitumens.
- 2) CONCAWE report No. 6/84 - Review of bitumen fume exposure and guidance on measurement.
- 3) CONCAWE report No. 85/57 - CONCAWE Statement on the IARC Review of Bitumen Carcinogenicity.
- 4) British Standard BS EN 529:2005 – Respiratory Protective Devices. Recommendations for the selection, use, care and maintenance. Guidance Document.
- 5) British Standard BS EN 166:2002 – Personal Eye Protection. Specifications.
- 6) Institute of Petroleum - Model Code of Safe Practice, Part 11, Bitumen Safety Code (1991).

## FURTHER ADVICE

All products should be used in accordance with the manufacturers' instructions.

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