

# *Introduction*

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Mastic asphalt has been used in below-ground tanking situations for decades. When applied correctly, in a 3-coat specification, the ability of mastic asphalt to resist the ingress of water, even under pressure, is outstanding.

This Technical Guide gives recommendations for use of mastic asphalt in tanking applied both internally and externally. Mastic asphalt for tanking shall conform to type T1097 in BS6925, or BS EN 12970.

# *Design considerations*

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## **General**

It is essential that a clear distinction should be drawn at the initial design stage between tanking and tank lining to liquid containing structures, as these two waterproofing systems differ in their fundamental purpose and impose their own design constraints which cannot be ignored without risk of failure and possible contravention of British Standard Code of Practice recommendations.

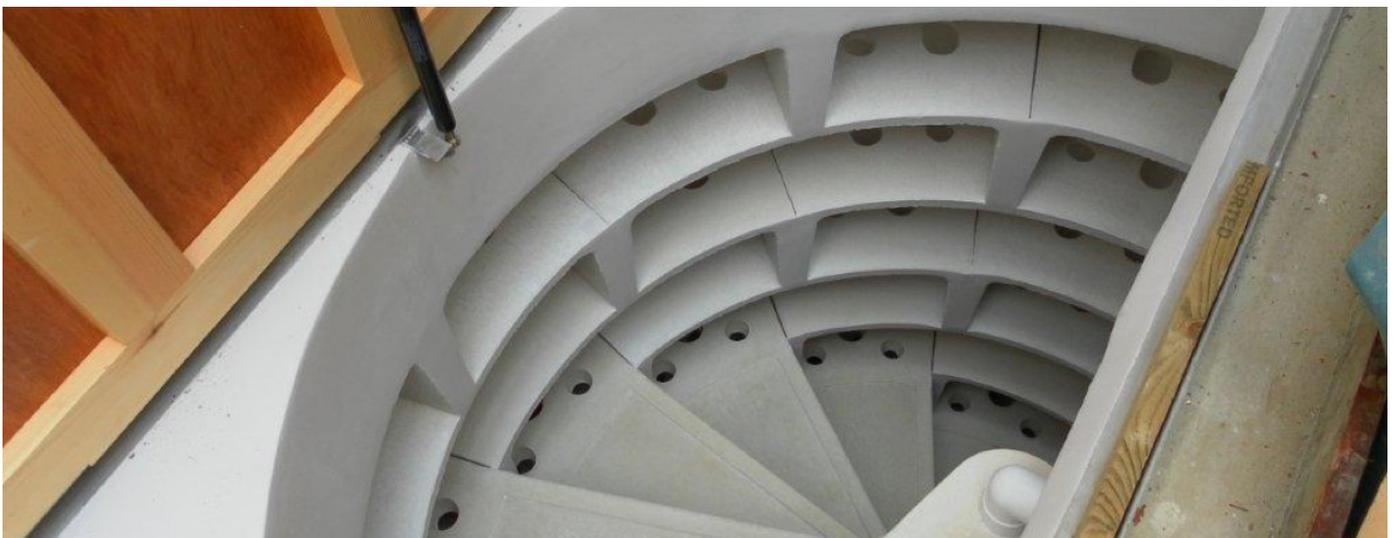
BS 8120:2009 - Code of practice for protection of below ground structures against water from the ground - gives recommendations and provides guidance on methods of dealing with and preventing the entry of water from surrounding ground into a structure below ground level. It covers the use of:

- a). Waterproofing barrier materials applied to the structure
- b). Structurally integral watertight construction; and
- c). Drained cavity construction.

BS 8120:2009 also covers the evaluation of groundwater conditions, risk assessment and options for drainage outside the structure, and applies to structures which extend below ground level and those on sloping sites.

BS 8120:2009 does not give recommendations concerning the use of embedded heating in structures, floors and walls or for the special requirements in connection with the design and construction of cold stores.

NB: Structures are generally characterized as “deep” if they have more than one storey below ground level, or “shallow” if they have only a single storey below ground. This standard is applicable to both. In practice, it is advisable to assume that the head of water is developed from ground level, to the full depth of the excavation to allow for seasonal fluctuation in the water table.



## Externally applied tanking

In order to ensure that the substructure provides a suitable base on which to lay mastic asphalt, attention should be given to the following factors:

- a. Horizontal surfaces to which mastic asphalt tanking is to be applied should be level and free from irregularities such as ridges, dips, fins or concrete or mortar droppings. The surface of the concrete should, therefore, be given a wood-floated finish and be laid place and true to allow the specified mastic asphalt thickness to be applied uniformly.
- b. The concrete slab on which mastic asphalt tanking is applied should be designed and laid in a manner to ensure that any superimposed loads, such as protective screeds, concrete loading slabs and any plant, equipment or machinery subsequently used or installed, can be supported without deflection or other movement which could induce cracking in the mastic asphalt tanking.
- c. It is essential that the vertical asphalt is applied to structural walls capable of resisting any anticipated internal or external loads or pressures.
- d. In order to ensure continuity of the tanking, the provision of openings for services, pipes, cables, etc. through walls or floors which are to be tanked should be avoided. However, where such openings are essential, special treatment should be provided around the opening.
- e. To ensure continuity of the mastic asphalt tanking in basement supported on piled foundations it is essential that there should be complete separation between the floor of the basement and pile caps. The mastic asphalt tanking should be laid as a continuous membrane over the entire area of the basement floor.

When the mastic asphalt is applied to a basement structure's external walls, the concrete base must extend at least 150mm beyond the outer face of the basement wall. The horizontal mastic asphalt is laid on the base concrete in three coats to a total thickness of 30mm and must cover the full slab area.

A cement, sand screed of 50mm minimum thickness must be laid immediately to protect the mastic asphalt against damage by following trade operations, taking care to ensure that the mastic asphalt is not damaged during screeding.

A loading coat of concrete, of sufficient strength to resist the maximum anticipated water pressure is laid over the screed as soon as possible and prior to any other work being undertaken. No loading concrete need be applied over the minimum 150mm wide 'pick-up', but the 50mm protective screed must be laid on building paper over the mastic asphalt 'pick-up' to avoid contamination of the mastic asphalt surface.

The walls of the basement are erected on the loading slab concrete and the vertical mastic asphalt tanking is applied to the external face of the walls in three coats to a total thickness of 20mm after the 50mm thick horizontal protective screed and building paper have been removed.

A two coat fillet must be applied at the angular junction between the vertical tanking and the mastic asphalt 'pick-up'. It is essential to ensure that the 'pick-up' is completely free of all cement slurry, mortar droppings or other contamination in order that complete fusion of the fillet to the mastic asphalt is achieved.

A protective wall of brickwork or blockwork should be built against the external vertical tanking membrane leaving a 40mm gap between the protecting wall and the mastic asphalt, which must be filled solid with mortar, course by course, as the work proceeds. This procedure is essential to protect the mastic asphalt membrane against the effects of solar heating and subsequent damage during the backfilling operation, or in the event of subsequent excavation.

The laying of dry-jointed brickwork is to be avoided or any form of blockwork or brickwork built directly against the mastic asphalt without the 40mm mortar filled gap. Such methods do not provide the degree of protection essential to achieve a sound and secure tanking operation.

## External tanking excavation

To provide the operative with sufficient working space to apply the mastic asphalt to the external face of the structure a minimum width of 900mm beyond the wall face should be allowed.



## Internally applied (sandwiched) tanking

The excavation should provide approximately 300mm of space outside the wall to keep the wall as dry as possible during the application of mastic asphalt.

The structural slab forming the base should be provided with an even surface to receive the horizontal mastic asphalt and walls should be built up to the full height of the tanking before the mastic asphalt coat is commenced.

The earth should be kept clear of outside walls and should not be filled in until the three coats of vertical mastic asphalt have been applied and the loading coats have hardened.

As soon as the horizontal mastic asphalt has been laid and the angle fillets completed, a protecting screed of sand and cement 50mm in thickness and laid on an isolating layer should be applied to prevent damage to the mastic asphalt. The protective screed should be followed by the laying of the structural floor on walls. When masonry is used for the loading coat it should be set 40mm away from the mastic asphalt and the space so formed should be thoroughly flushed-up course by course with sand and cement mortar in order to ensure that the loading coat and the mastic asphalt are in close contact.

## Loading slabs and walls, protective walls and screed

When placing concrete or erected brickwork, either for the loading of internal tanking, or the protection of external tanking, the greatest of care must be exercised by operatives in order to avoid impact or other damage to the mastic asphalt. Similar care must be taken when laying the 50mm protective screed, referred to under the heading for internal and external tanking.

## Tank linings for liquid-containing structures

The purpose of a mastic asphalt lining is to prevent the escape of liquids from a containing structure. The lining is always applied in three coats to a total thickness of 30mm on horizontal and 20mm on vertical surfaces.

The internal pressure of the contained liquid, against the lining, should be calculated in a similar way to external pressure in tanking applications but taking into account the density of the liquid and, where the level of liquid in the container is at a relatively constant high level, this pressure will be sufficient to prevent any loss of adhesion of the mastic asphalt to the structural surfaces.

## Pumping

It is essential that the ground water table is kept below the level of the base concrete throughout the entire tanking operation, and for this purpose, site de-watering or pumping must be provided on a continuous and uninterrupted basis until the loading slab and concrete walls have hardened and/or the mortar in the brickwork has set.

It must be emphasised that complete continuity of the pumping operation must be maintained throughout the entire tanking operation and no interruption of the pumping must be permitted for whatever reason until the loading slab and walls are fully hardened and set. In view of the extreme importance of this factor, those responsible for the operation should consider the provision of emergency standby facilities, to allow for any possible breakdown in the main pumping mechanism.

The asphalter cannot take responsibility for any damage to the tanking which may occur due to water pressure on the unloaded mastic asphalt.

## Backfilling

No backfilling should be carried out until all the tanking and loading is complete.

## Internal tanking excavation

In all tanking operations dry working conditions should be maintained. In internal tanking excavation a recommended space of 300mm should be provided around the structure to a minimum of 300mm below the foundation level to keep the walls as dry as possible during the progress of the asphalt work and the subsequent loading of horizontal and vertical tanking.

