

Technical Advisory Note

Use of Caisson Components for Water Retaining Tanks.

Marshalls CPM manufacture Caisson Systems which comply with the requirements of BS 5911-3:2010+A1:2014. Note BS5911-3 does not specifically include Caissons in the scope however they are manufactured to comply with the requirements of the standard.

The scope of the standard covers products for *'sewer systems for the conveyance of sewage, rainwater and surface water under gravity or occasionally at low head of pressure'*.

The watertightness test requirement for manholes is consequently a 5m head of water for 15 minutes designed to simulate a **temporary** surcharge of water.

Products being used for a tank and subject to a **permanent** head of water require a concrete surround. Sewers for Adoption details a minimum 200mm concrete surround to pre-cast concrete chamber rings for a wet well submersible pumping chamber. This would provide Class 1 watertightness in accordance with BS EN 1992-3 'Liquid retaining and containment structures'. See attached extract from BS EN 1992-3 Table 7.105 'Classification of tightness'.

However, as the above is not possible with a Caisson system, to achieve Class 1 watertightness the following is advised;-

Chamber rings with flat joints - TA 200 Butyl Sealant satisfactory.

Chamber rings with tongue and groove joints - TA 200 Butyl Sealant plus a hydrophilic sealant typically 20x5mm profile or hydrophilic mastic applied centrally to the inner lip of the joint.

Note:

The above will not provide a water retaining structure complying with BS EN 1992-3 'Liquid Retaining and Containment Structures' Classes 2 / 3.

For any installation outside the intended scope, consideration should be given to the installation and service conditions the products will be subjected to, whereby additional measures may be required to provide a satisfactory structure complying with Class 2 or 3 watertightness.

BS EN 1992-3:2006
Eurocode 2 – Design of concrete structures
Part 3 ‘Liquid retaining and containment structures’

Section 7 Serviceability limit states

7.3 Cracking

7.3.1 General considerations

(110) It is convenient to classify liquid retaining structures in relation to the degree of protection against leakage required. Table 7.105 gives the classification. It should be noted that all concrete will permit the passage of small quantities of liquids and gasses by diffusion.

Table 7.105 – Classification of tightness

Tightness Class	Requirements for leakage
0	Some degree of leakage acceptable, or leakage of liquids irrelevant.
1	Leakage to be limited to a small amount. Some surface staining or damp patches acceptable.
2	Leakage to be minimal. Appearance not to be impaired by staining.
3	No leakage permitted.

(111) Appropriate limits to cracking depending on the classification of the element considered should be selected, paying due regard to the required function of the structure. In the absence of more specific requirements, the following may be adopted.

Tightness Class 0. – the provisions in 7.3.1 of EN 1992-1-1 may be opted.

Tightness Class 1. – any cracks which can be expected to pass through the full thickness of the section should be limited to w_{k1} . The provisions in 7.3.1 of EN 1992-1-1 apply where the full thickness of the section is not cracked and where the conditions in (112) and (113) are fulfilled.

Tightness Class 2. – cracks which may be expected to pass through the full thickness of the section should generally be avoided unless appropriate measures (e.g. liners or water bars) have been incorporated.

Tightness Class 3. – generally, special measures (e.g. liners or pre-stress) will be required to ensure watertightness.