

## **WHAT IS BS 8102: 2009 AND WHAT DOES IT MEAN TO SPECIFIERS OF STRUCTURAL WATERPROOFING PROJECTS?**



BS 8102 is a design document whose purpose is to inform the designer of the various methods of waterproofing available and to assist in the correct specification of those systems. Although other documents are available, BS 8102 is THE document that you should be familiar with. Although not UK law, failure to use BS 8102 could result in the designer having a difficult time in a court of law in the event of litigation following a waterproofing failure. It is almost certain that this code of practice will be used by the prosecuting expert witness.

*The New British Standard BS 8102:2009 came into effect 30 November 2009 and supersedes BS 8102:1990*

A number of new recent developments are addressed which are important when specifying, designing and constructing below ground structures including:

- More deep construction in urban areas
- The increase in provision of residential basements
- The development of and use of new waterproofing materials

The standard expands on its predecessor in that it provides guidelines for detailed assessment of the risks inherent in below ground construction and how these might be addressed.

### **The New Standard And What It Entails**

The new standard recognises that it is essential for the success of any project involving below ground structures that strategies for dealing with groundwater, soil gases and contaminants are considered from the very earliest stages of the planning and design processes. For new structures it is recommended that the structural design, overall weatherproofing design and construction processes are considered together as they generally interact. In addition it is recommended that during the design process and at all stages of the construction process, the designer's specialists manufacturers, suppliers and installing contractors establish and maintain effective channels of communication. Regular and clear communication coupled with good site supervision allows variations and amendments to the design to be planned and executed without compromising the performance of the waterproofed structure.

In our experience this “team” approach from design stage allows for successful and cost effective waterproofing and as part of the rewrite committee we were very keen for the this strategy to be emphasised. ***A welcome inclusion to the standard now asks for waterproofing specialist to be included as an integral part of the design team to ensure that an integrated waterproofing solution is realised.*** Criteria outlined in the standard are that the individual be:

1. Suitably experienced
2. Be capable of devising solutions that accommodate the various projects constraints and needs
3. Provide the design team with information and guidance that assists with and influences the design, installation and future maintenance of the waterproofed structure.

### **Principles of BS 8102**

Principle considerations are listed in BS8102 in order to develop a robust design for protecting a structure against groundwater. The overall general principle is to assess the risk of water reaching the structure and then to select a waterproofing system capable of achieving the required internal environment. The ideal waterproofing solution would be defect-free. However it should be noted that two types of defect might occur in any waterproofing where a structure is subject to water pressure, and this could mean that the required internal environment is not achieved.

These defects are as follows:

1. Defects owing to poor quality workmanship
2. Defects owing to the specific properties of the materials being used

It is essential that the construction methods and materials used to realise the design are such that the defects in workmanship are a) are avoided and b) which are generally minor, should be recognised and catered for in the design. Contingency planning for dealing with any localised defects or system failure that arise should be included as part of the overall water resisting design of the structure. In either case it is vitally important to take into account the ability of reparability of the waterproofing system and the feasibility of remedial measures assessed. The ability to repair external systems has changed the way professional waterproofing contractors can now guarantee external waterproofing projects and highlights the practical nature of the type C drained protection option.

## **Risk Assessment**

As a part of the new design standard it is advised to carry out a risk assessment stipulating that the principle risks with respect to water ingress into structures are the external environmental conditions. As a part of the risk assessment it is also suggested to perform a Desk Study in accordance with BS 5930 and BS EN1997:

1. To assess the geology and hydrogeology , including soil permeability, flood risk, radon, methane and other ground gases and contaminates. (e.g. chlorides and acids)
2. To assess the topography of the surrounding ground in relation to the below ground structure
3. To establish the likely highest level of the water table and the potential for the occurrence of a perched water table; and
4. To identify any issue with ground and ground water information which should then be obtained by undertaking a site investigation in accordance with BS59230 and BS EN1997
5. The drainage characteristics for analysis of the soil should be determined in accordance with BS8004

Taking all the information above on board allows the design team to prepare the most robust waterproofing details to provide the environmental grade that they are seeking to achieve. However even with all this analytical information it is a brave individual who seeks not to protect the structure by believing that water will not come to bear against it. The burst water main and flash periods of flooding are becoming more prevalent and the design must be able to deal with all eventualities. **It may very well be the worst case scenario but waterproofing designers have to be 100% sure that their designs are robust enough to deal with all possibilities.** It is worth noting that in the standard it clearly states: *“Even in a permeable subsoil, groundwater requires time to drain away and this can result in limited pressure periodically coming to bear against the structure”.*

It's difficult to predict our weather these days!

## **Other Design Principles**

The new standard has many other important design principles for the design team to consider:

Designers are urged to design structures to full head in all earth retaining situations where:

1. No detailed geological or hydro geological assessment has been undertaken
2. The results of the soil investigations are inconclusive with respect to groundwater
3. The ground drainage characteristics are unreliable
4. The drainage measures either internal or external are unreliable or un maintainable and infiltration cannot be controlled

*Even with a full site investigation available to you, as a designer you are required to make the design decisions to protect your structure from water from the following sources, not just underlying water tables:*

1. The inflow of surface water, ranging from percolation of rain to inundation of water from burst water mains
2. The water pressures acting on the external retaining wall system
3. The water pressures below the slab base



It is also noted that water resisting design should enable the system to withstand a pre-determined head of water or control the water before it reaches the structure. In a worst case scenario, designers have to account for full head of pressure at some point in the structures life and that the system installed is robust enough to manage the potential ingress, taking into account that defects may be present in the application of the waterproofing system.

### **In Conclusion**

To sum up, the British Standard has been upgraded to include the new technologies available to waterproofing designers, and the suggested “packaged” waterproofing design involving a qualified design team has addressed the previous issues which resulted in many failures of waterproofing systems, namely poor workmanship and poor choice of materials. These changes allow for manufacturers, specifiers and end clients a “peace of mind” that waterproofing can be performed constantly to a managed high standard so that as the use of basement space becomes more and more popular, the correct combination of materials and planning is available to get it done correctly the first time.