IN-SITU CONCRETE SLURRY STORES

Figures 1 and 2 illustrate the typical arrangements for the construction of in-situ or cast in place concrete slurry tanks. Most in-situ concrete structures contain steel reinforcement for structural integrity.

Concrete is weak in tension so steel reinforcement is placed within the concrete to counteract tensile stresses. It is important that the reinforcement is exactly located within the structure.

Formwork, as in figure 2, is used to ensure the correct dimensions of the finished concrete and also to help support the reinforcement during casting.

In-situ concrete work is affected by site conditions and requires strict quality control. Adverse weather can have a detrimental effect if precautions are not taken. High standards of workmanship must be maintained to minimise the risk of failure, e.g. by following the specification and design details.

Drawings and specifications must be obtained from suitably qualified persons, e.g. chartered civil or structural engineers.

Site Suitability

- Avoid sites in a flood plain or sites with a high water table.
- Avoid improperly filled ground or other unsuitable ground conditions such as peat soils or ground liable to subsidence.
- Locate at least 10 metres from a water-course (See References 1 & 2)
- Suitable sites are on firm and level, non-organic sub-strata capable of bearing the full weight of the tank and its contents without adverse effect.
- Consult the Environment Agency and the Local Planning Authority when selecting a site.

Specification

- Size the store to conform to the Control of Pollution Regulations, the Water Code and BS 5502. Allow for freeboard and rainfall when calculating the size (See References 1, 2 & 6).
- Concrete tanks and bases may be designed to BS 8110 or BS 8007. (See References 3 & 4).
- Use a designated RC40 mix to BS5328 - equivalent to C35A mix to BS 8007 (See Reference 5).
- For severe exposure conditions as defined in BS 8110 use RC45 or RC50 mix for very severe conditions.
- Use sulphate resistant cement for below ground work if sulphates are likely to be present.
- Admixtures to aid workability or control setting time should only be used according to specification.
• BS 8007 is the recognised standard for designing and building concrete structures for retaining liquids. Comprehensive design information including workmanship and material specifications for building durable watertight tanks is given.

• Fit properly sealed water-stops in joints to conform to BS 8007, see figures 3 & 4.

Figure 3 - Waterstop for continuous construction

Figure 4 – Waterstop in wall movement joint

• Control cracks in the finished concrete by limiting the size of the concrete bay and providing steel reinforcement. Further information is provided in BS 8007 & CIRIA Reports Nos. 126 and 164 (See References 4, 6 & 7).

Construction

• Prepare, level and compact the formation and lay blinding concrete/polythene membrane as detailed in the design.

• Provide and fix correctly specified reinforcement to positions and sizes shown.

• Clean formwork and prepare with release agent. Fix formwork rigidly, according to the dimensions of the finished structure. Clean and prepare surfaces prior to pouring concrete.

• Use ready mixed concrete conforming to BS 5328 from an assured supplier (See Reference 5).
  – Do not place during adverse or freezing weather conditions or against frozen surfaces.
  – Transport in proper manner and place continuously in final position avoiding segregation.
  – Compact using mechanical vibration so that no voids or other defects occur in finished work.

• After casting, remove formwork and make good any surface blemishes.

• Cure the concrete for at least 7 days using resin based curing agent, plastic covering and methods specified in BS 8110. Apply long lasting impermeable joint sealant to joints (See Reference 3 & 6). Apply protective surface coatings as required.

• Do not fully load concrete until it has achieved its design strength (or equivalent to the 28 day strength).

Repair and Maintenance

• Ask the designer and installer for operating and maintenance instructions.

• Maintain adequate safety fences, safety precautions and warning notices.

• Do not fill above the 300mm freeboard level.

• Joints require regular inspection and joint sealants must be properly repaired when necessary.

• Inspect and make good damage and defects while store is empty and well before re-filling.

• Particularly inspect interfaces such as wall and floors and areas such as joints and ramp areas where mechanical damage could occur.

• Inspect areas subject to abrasion or heavy traffic where surface defects may occur.

• Refer to CIRIA Report No 126 and 164 for further information on techniques for repairing damage (See References 6 & 7).

References

1 The Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991 (as amended).
2 The Code of Good Agricultural Practice for Water; MAFF (Free publication).
3 British Standard 8110: Structural use of concrete; British Standards Institution.
4 British Standard 8007: Code of Practice for design of concrete structures for retaining aqueous liquids; British Standards Institution.
5 British Standard 5328: Concrete specifications and procedures; British Standards Institution.
6 CIRIA Report No 126: Farm waste storage- Guidelines for construction.
7 CIRIA Report No 164: Design of containment systems for preventing pollution.