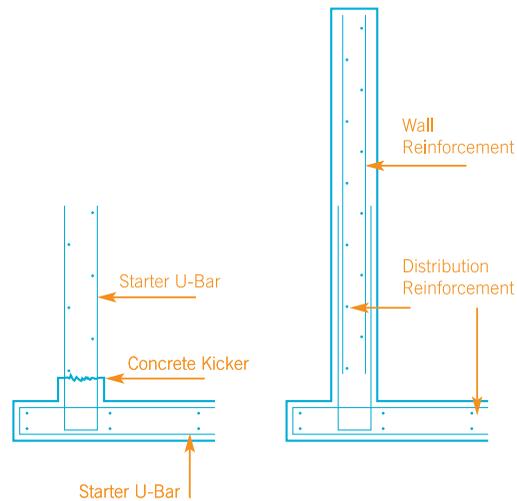


### Concrete Effluent Tanks

#### Design

- Concrete tanks are generally required to withstand forces both from the contained effluent and backfill material.
- Concrete is strong in compression but to withstand the tensile stresses in tank walls reinforcing steel is essential. The exact size and length of reinforcement is determined primarily from the tank depth – see Department of Agriculture FDS specification for varying reinforcement requirements.
- An arrangement of U-shaped bars in both the base and lower wall is a very effective method of reinforcement at the critical wall-floor joint (see diagram).
- The reinforcement should be protected by a cover layer of dense concrete 40-50mm thick to prevent corrosion. This is achieved using proprietary spacers to ensure the cover is maintained.
- Construction joints may be required in long walls. See FDS specifications for design options.
- The correct mix for a concrete effluent tank is given in Table I.



#### Construction

- In the base, the arrangement of U-shaped bars must be firmly tied. Straight bars are used both to hold the U-bars in place and prevent cracking due to shrinkage. Extra steel may be required at the top of the base slab if upward pressure from ground water is expected.
- A kicker or small wall section 75mm high should be cast as part of the base slab to provide a convenient starting point for the wall and to ensure integrity at this important junction. The top surface of the kicker should be roughened to ensure an adequate bond with the wall concrete. Alternatively, water bars can be used as described in FDS specifications.
- The formwork for the walls needs to be firmly fixed and braced to withstand the pressures of the fresh concrete. It should be oiled with a proprietary mould oil to allow easy removal. Diesel oil should not be used.
- The full height of the wall should be poured in one operation and the concrete brought up in layers of 600-800mm. Use of a poker vibrator is essential to achieve full compaction and removal of entrapped air. The poker should be placed in the concrete to such a depth that it reaches the layer beneath. This will ensure full compaction at the interface between layers.
- Concrete must be cured, as outlined earlier.
- Backfilling should not occur to full height until at least three weeks after construction.
- Concrete tanks should not be filled with effluent for a month after construction.

#### Notes

- Tanks should be constructed in accordance with a detailed specification.
- Steel should be carefully placed in accordance with the drawings.
- Ensure the correct mix is ordered and keep a strict control on the addition of water.

#### Remember!

- Use Irish Cement that has been stored in dry conditions.
- Use only clean sand and gravel.
- Select the right mix for the job and always keep a strict control on the addition of water.
- Compact concrete with a minimum of delay, particularly in warm weather.
- Protect freshly placed concrete from rapidly drying out and from frost.
- The readymixed supplier is responsible for providing material as ordered. Do not add extra water as this weakens the concrete and may invalidate the supplier's guarantee.
- Advisory Engineers are always available to help solve problems related to the use of concrete on the farm.

#### Care in use

A health and safety data sheet, giving practical guidance on handling cement, is available from our Technical Marketing department, or on our website.

#### Irish Cement Series

- |   |                           |   |                             |
|---|---------------------------|---|-----------------------------|
| 1 | Mixing & Placing Concrete | 4 | Floor Screeds               |
| 2 | Blockwork & Plastering    | 5 | <b>Concrete on the Farm</b> |
| 3 | Precast Concrete Paving   | 6 | Cement Silos                |

#### Advice and Information

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Using Irish Cement  
**Concrete on the Farm**

# 5



## Introduction

Each year Irish farmers undertake a large amount of building work, ranging from major new jobs to extensions to existing buildings, effluent tanks and minor improvements around the farm. Many achieve excellent results but unfortunately there are a number who end up with concrete structures of inadequate quality that will not perform satisfactorily and that will require costly maintenance within a few years.

There are a few simple rules, which if carefully followed, will ensure that concrete is of good quality and will give a lifetime of trouble free service.

This leaflet has been produced by the Technical Marketing Department of Irish Cement Limited and is based on many years experience of the particular needs of Irish farmers. The information it contains is set out in the form of general guidelines applicable to both large and small jobs. It is supported by an advisory service freely available to help with special problems that may arise from time to time.

## What is Concrete?

Concrete is made by mixing stone and sand with cement and water in carefully selected proportions and allowing the compacted material to set and harden. As setting and hardening are chemical processes, it is important that concrete is prevented from rapidly drying out after placing otherwise strength development may be impaired.

Properties of concrete are to a large extent dependent on the quality of the sand and coarse aggregate used and for this reason it is important that only materials free from clay or other forms of contamination be used.

For very small quantities, it may be appropriate to mix concrete on the job, but where larger volumes are involved, readymixed concrete ensures better quality and is recommended.

## Before undertaking even small jobs in concrete, be sure to:

- Plan the job carefully before starting the work.
- Decide whether it is appropriate to use readymixed concrete or to mix on site for small jobs.
- Select a concrete mix suitable for its intended application
- Use cement you can trust - Irish Cement is well tried under Irish conditions and is supported by an advisory service to assist farmers with any technical or practical queries that may arise.

## The Right Mix for the Job

The Department of Agriculture requires that all concrete being supplied to farms for grant-aided structures or facilities complying with the 'Nitrates Directive' must be supplied from plants which are independently certified to IS EN 206, the concrete standard. Site mixed concrete is not permitted.

Readymix concrete producers employ a standard mix designation which should be used when ordering concrete, see Table I for the mixes specific to the Department of Agriculture. The second figure in the Mix Designation column indicates minimum characteristic cube strength. Adequate durability is achieved by specifying cement content appropriate to the demands made on the concrete. This is particularly important for silage pits and milking parlour floors.

**Table I Readymixed Concrete**

Application	Concrete Strength	Mix Designation	Minimum Cement Content (kg/m <sup>3</sup> )
Foundations, Floors, Yards, Slurry tanks, General reinforced concrete	35N	C28/35	300
Silage pits, Effluent tanks containing silage. Milking parlour floors, areas subject to severe abrasion	40N	C32/40	350

- Concrete must be sufficiently workable to allow full compaction after placing. Air voids left in the concrete reduce its strength and durability.
- The addition of extra water to either increase workability unnecessarily or to restore workability to concrete left unused for extended periods weakens the cement 'glue' and reduces the overall performance of the concrete.

## Small Quantities

For very small quantities, it may be appropriate to mix concrete on the job (*where otherwise not prohibited as described above*). Table II gives two mixes appropriate for volumetric batching on the job.

**Table II Volume Batching on the Job**

Application	Proportions by Volume Cement: All-in Aggregate*	Water
Foundations, Bases, Dry Internal Floors	1:6	11-13 Litres (2.5-2.75 Gals) per 25kg bag of cement depending on mix and moisture content of aggregate. Aim always for the lowest water content which allows full compaction.
Floors, Yards, Slurry, tanks, General reinforced concrete	1:4.5	

\* 60% coarse aggregate and 40% sand by volume generally gives acceptable results. All aggregates should be washed.

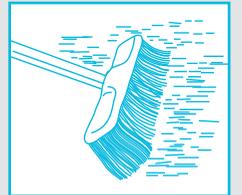
- As workability starts to decrease shortly after mixing, only the quantity of concrete that can be placed and compacted within one hour should be produced at any one time. This is particularly important in hot dry weather.

## The Final Stages

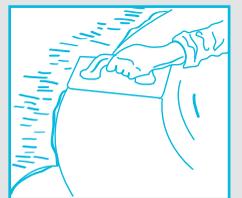
### Compaction and Finishing

Concrete must be fully compacted. The presence of entrapped air in hardened concrete reduces strength and critically affects durability.

While hand tamping is appropriate in some cases, it is easier to achieve full compaction using mechanical methods. These include vibrating screeds for yards and floors and poker vibrators for walls, silos and for the edges of slabs.



Brush finish



Steel float finish



Wood float finish

The timing of the final brushed, tamped or trowelled finish is very important. Premature finishing draws excess water and cement to the surface and this invariably leads to rapid surface deterioration and poor resistance to wear. Unnecessarily wet mixes greatly delay the work of finishing and inevitably cause serious and unnecessary difficulties.

## Curing

Concrete needs to be protected to prevent moisture loss, especially for the first 7 days after placing. This will help produce a durable concrete, with low permeability. The interval between final finishing and the start of curing should be kept to a minimum to avoid damage to the surface. The more usual methods for curing include covering with damp sacking, damp sand or polythene sheet or spraying continuously with water. Alternatively, the surface can be treated with a suitable spray-on curing membrane. In cold weather, polythene sheet covered with straw provides protection against frost.