Hardened Properties

Testing of Firth SCC in New Zealand has proven it to be equal or superior to normal concrete in hardened properties. Firth SCC has also been proven to have superior bond to top bar reinforcing compared to normal concrete.

Table 1 compares a Firth SCC mix developed for Auckland to normal 50 MPa concrete.

TABLE 1

Property	50MPa Concrete	Firth Auckland SCC
7 Day Strength	48.0 MPa	49.5 MPa
28 Day Strength	58.5 MPa	74.0 MPa
56 Day Strength	62.0 MPa	80.5 MPa
Elastic Modulus	38.5 GPa	39.4 GPa
Tensile Splitting	3.6 MPa	5.2 MPa
Rapid Chloride Ion Test	3103 Coulombs	1833 Coulombs
56 day Drying Shrinkage	820 microstrains	740 microstrains

These tests were conducted in Auckland using crushed greywacke aggregate, the most commonly used aggregate in New Zealand. Actual results for other aggregates may vary, but the relative results between normal concrete and SCC will be similar to those above.

05/02

Firth

0800 800 576

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Firth

CONCRETE SOLUTIONS

SELF COMPACTING CONCRETE

Firth Self Compacting Concrete (SCC) is concrete that flows into place under its own weight, without segregation and flow blockage. SCC can flow through congested reinforcement or complex formwork and achieve complete filling and consolidation without mechanical compaction. The elimination of mechanical compaction saves time, labour, equipment requirements and formwork damage; and it does all this silently. What's more, the off the form finish can be exceptional, reducing rework and saving time.

SCC is more than just a high-workability (high slump) concrete. SCC is a carefully proportioned mix of fine and coarse aggregates, cement and fine fillers, and chemical admixtures to produce highly deformable but viscous concrete. Being deformable, it will flow under its own weight, and being viscous it carries the coarse aggregate without segregation. A correctly proportioned SCC will flow up to 10metres on a minimal slope and still carry the coarse aggregate without segregation.

Benefits

- **SPEED** Providing the formwork can take it, the formwork can be filled to the top without stops for compaction.
- **FINISH** The SCC off the form finish is typically better than that achieved with traditional concrete and methods, and can be exceptional, reducing the need for rework and repairs.
- **NOISE** The vibrator is usually the noisiest machine during a pour. It is eliminated.
- **LABOUR** Since compaction is not necessary, labour is greatly reduced. If the SCC is being pumped, the whole pour can often be left to the pump operator and hoseman.
- **SKILL** The need for quality construction workers is reduced.
- **FORMWORK REUSE** No vibrators means no vibrator burns to the form face.

Where should I look to use it?

- Virtually anywhere that time, noise or labour may be a problem.
- Where finish is important or there is a large surface area for the volume of concrete.
- Where there is congested steel or difficult formwork shapes.
- Where access is difficult.

How do I find out more?

Simply call your local Firth office or Firth Customer Services on 0800 800 576

Formwork Requirements

While the SCC is free-flowing, European testing shows that the full hydro-static head is not developed for pours deeper than 3m. Because of this, formwork requirements are similar to that required for rapidly placed normal concrete, but if in doubt, design for full hydro-static pressures.

Joints need to be water-tight to prevent grout loss, but a small leak does not always mean that localised honeycombing will result.

The final finish reflects the quality of the formwork as much as anything else, so quality forms and release agents should be used. The best finishes are obtained when the SCC flows past the form, sweeping off air pockets and bugholes. For a top quality finish, pumping from the bottom of the formwork should be considered.

Plastic Properties

The most obvious feature of SCC is that it spreads out to a thin regular pancake when slump tested. The spread diameter should be between 650mm and 750mm for best results depending on the materials used and the application. At 750mm spread, the SCC will flow down a slope of about 5%. This can be used to reduce the number of filling points, and to generate flow under set-downs and inserts ensuring complete filling.

Strength Gain

The rate of early age strength gains varies greatly depending on the mix. If high early age strength is a requirement, then the mix can be altered to suit. But for really rapid strength gain, heat is still required.