

MBT-Online

Metro Naples - Annulus Grouting



The project

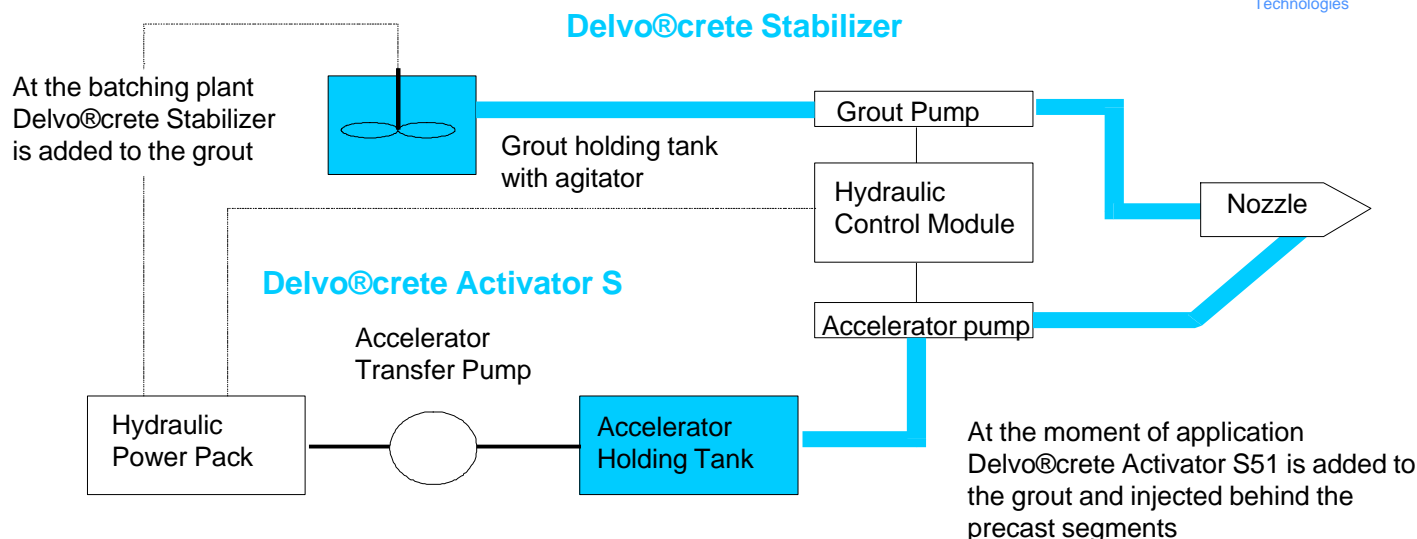
Traditional grouting materials proved to be unsuitable for the annular backfilling of segments in the new twin tunnels of the Naples Metro.

The tubes, each with a length of over 2000 metres, feed through pozzolanic soil and tuff. Both rock types are very unstable and prone to cave-ins.

Excavation is done with a Shielded TBM to provide immediate support before precast concrete segments are placed and grouted.

Traditional grouts were not suitable for this project because of their limited open time and complicated handling (flushing of pipes after each grouting operation etc.)

**Innovative use of the
Delvo®crete
Hydration Control system
for Annulus Grouting**



- ◆ Fluid, pumpable consistency for 6 - 8 hours
- ◆ Initial setting time of <30 seconds (eliminates grout flowing around shield and out of segment joints)

- ◆ 1 MPa at 70 minutes
- ◆ No pipe cleaning, except for shutdowns and when very long delays are foreseen

Mix Design - kg/m³

Sand (F.M =3.1)	1000
Pozzolanic Cement (Type 32,5)	500
Fly Ash	50
Water	320
Delvo@crete Stabilizer	0.2 - 1 litres
Initial Flow	160 - 170%
Flow at Time T* (minimum required for pumping)	120 - 130%
Delvo@crete Activator S-51	2 - 3%

Delvo@crete Stabilizer :

Dosage vs flowability time

Time(T)	2 hours	4 hours	6 hours	8 hours
Flow(%)	135	130	130	125
Dosage (L per 100 kgs of cement)	0.2	0.4	0.7	1

*See table <Dosage vs flowability time>

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