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Embedding PAM SMU Cast Iron Drainage Pipes in Concrete

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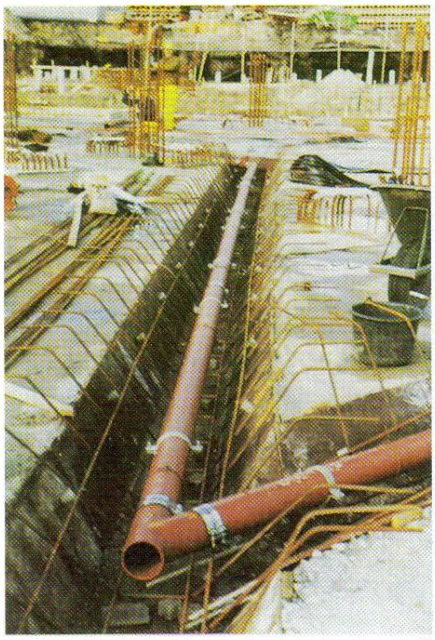

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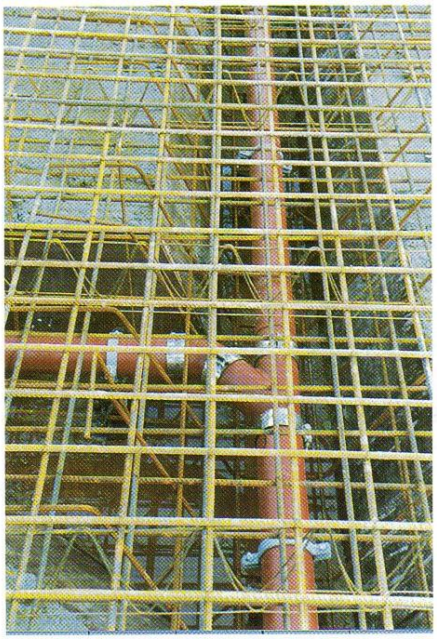

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several parallel or branching pipes, it is best to fix them collectively on steel sections with pipe brackets. See Pictures 4 and 5. In this example height adjustment was achieved by fixing the threaded rods in holes in the steel sections with nuts and locknuts.

SMU Underground Pipes in the Concrete Flooring

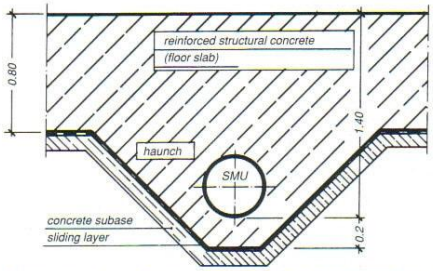
Setting the SMU underground pipe in the concrete floor is recommended mainly for the following two cases:

- Firstly in the case of very high groundwater levels. Here, concrete embedding offers the advantage that pipes only have to be passed through the waterproof floor slab in a few places, sometimes even only one. Also, pipes themselves are protected from the groundwater which may be corrosive.
- Secondly in the case of non-load-bearing soil. Concrete embedding ensures the replacement of soil, soil improvement and expensive bracketing for fixing the pipe underneath the floor slab can be avoided.

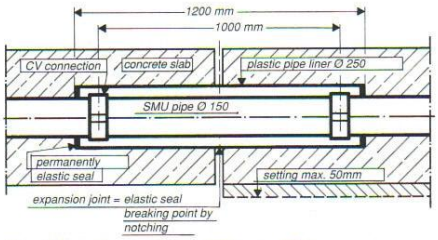
When embedding pipes in the concrete floor, it must be ensured that pipes are surrounded by concrete on all sides (approx. 20cm in case of waterproof concrete slabs). If the concrete slab thickness is insufficient, e.g. due to a gradient, the concrete slab has to be reinforced by a haunch around the pipe. See section drawing of haunch. Pictures 8 and 9 demonstrate how a SMU pipe should be laid in a haunch.

Differential Movement

To provide protection against possible settlement, a minimum of 2 joints (0.5 - 1.0m) apart are required, thereby allowing a short length of pipe to act as a 'rocker pipe'. These Pipes have to be supported in the concrete by means of a pipe liner, a polystyrene casing or similar, so that they are allowed to move. According to DIN 19 543, Aug 82, SMU-CV/CE and rapid couplings may be angled by 5cm/m installed length for nomimal diameters of up to DN200mm and by 3cm/m installed length for nominal diameters of DN250 to DN500mm. See section drawing of differential movement joint. As with the rest of the pipe, the pipe liner has to be sufficiently fixed to secure it against movement before concrete filling. A predetermined breaking point is to be provided in the pipe liner near the expansion joint by notching or cutting the pipe. The severed pipe liner has to be sealed with adhesive tape to prevent the intrusion of concrete.



Section drawing: haunch in a concrete slab



Section drawing: differential movement joint

Conclusion

At all stages of the work process, embedding drainage pipe in concrete requires close cooperation between the civil engineer and the plumbing planner as well as the building tradesmen and the plumber. A responsible professional tradesman employed by the installation company, should be present on the site for all work relating to concrete filling.

The following remarks and pictures of three examples document practical experience in embedding drainage pipes in concrete: the Cologne road tunnel along the Rhine, completed at the end of 1982 which has already passed its test under the high water pressure of 1983 (Pictures 1 to 3); the new building of a senior citizens residential and care centre in Hanover (Pictures 4 to 7) and the new building of a major bank in Amsterdam (Pictures 8 and 9).

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Alfred Horn, Cologne

When Groundwater Puts the Pressure on . . .

Embedding Drainage Pipes in Conrete

In many cases it is necessary to embed drainage pipes in concrete, be it in ceilings, walls or floors. Embedding underground pipes in concrete flooring is especially advisable where there is ground water and where the soil is not load-bearing. Drainage pipes embedded in concrete are subject to a high level of mechanical stress, not only during concrete filling but, also depending on the building's function, also after completion due to bending and tensile stresses within the concrete structure.

The drainage pipe material has to withstand these particular loads.

Cast iron pipes have nearly the same coefficient of thermal expansion as concrete: 0.0105mm/mK. Their expansion behaviour and, in particular, their high tensile and compressive strength and crush resistance allow SMU cast iron pipes and fittings to be used without problems for drainage pipelines that are to be embedded in concrete. Unlike earlier socket pipes, SMU pipes do not take up as much space, so the concrete depth required to accommodate pipe gradient and minimum cover thickness can be kept to a minimum.

The chromium steel clamping couplings (CV/CE or rapid couplings) with their EPDM sealing gaskets only project slightly. They are reliably tight and surrounding concrete does not impair their function. SMU pipes do not require any special protection against corrosion (e.g. wrapping), but should always be surrounded by at least 5cm of concrete on all sides.

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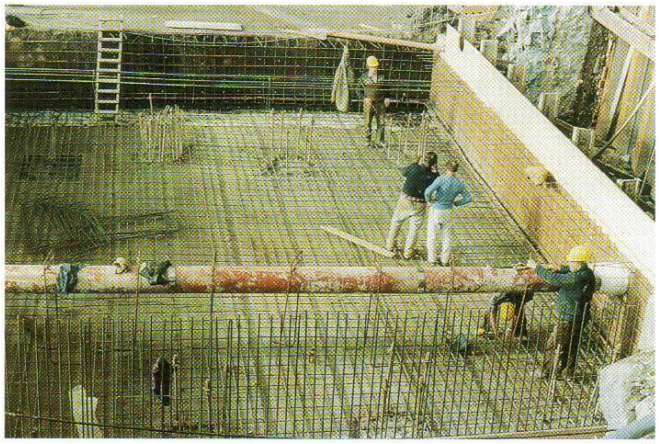

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Careful fixing of pipes

Before the concrete is paved, pipes have to be properly fixed and secured against displacement and floating upwards, especially at branches and changes of direction. For this purpose, pipes should be filled with water prior to concreting. Mechanical loads due to concreting are frequently underestimated, therefore pipes must be carefully bracketed to avoid any risks.

Each length of pipe has to be bracketed twice between couplings. Rocker Pipes should also be fixed at least once. Complex installations with several fittings should also be secured against movement. The safest way to do this is with a grip collar. This grip collar gives the required axial and bending resistance (see picture 10).

Cast-iron gullies for house, yard and road drainage can also be connected directly to the SMU-pipe using the CV/CE and rapid couplings and embedded in concrete. Gullies have to be fixed at the correct height and also secured against Movement.

Picture 2 details road gullies DN150 connecting to a DN300 pipe in the Rhine bank Tunnel Cologne.

Picture 3 details a single pipeline laid parallel to the gradient in a concrete base. e.g. in a road tunnel the easiest way to fix the pipe is with spacers made from reinforced steel.

Longer underground pipelines in floors of overground structures are best supported with pipe brackets and threaded rods so that the gradient can be accurately adjusted. In case of

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