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Jacking pipes with HDPE lining manufactured by Grafe Beton, Germany

Since April 2014, Perfect Pipe has been manufactured by the family-run company Grafe Beton at its site in Stölpchen, near Dresden. After production tests during the past year involving wet-cast concrete pipes of various nominal widths, Perfect Pipe – a concrete-plastic composite pipe – is currently made for use in a jacking project, with circular concrete pipes manufactured for trench construction. Grafe Beton has always used its innovative spirit to stand above the rest, and the company is characterised by its ability to make swift decisions that enable rapid responses to changing market conditions. The firm was awarded the Saxony State Prize for Quality and the title of "TOP Innovator 2011" for the willingness of its management as well as its staff to break new and rather unusual ground. Distinctive specialist knowledge and an identity that holds professional honour and personal commitment in high regard set Grafe Beton's staff apart, and have formed the basis for the company's success for decades.

■ Christian Weinberger, Schlüsselbauer Technology GmbH & Co KG, Austria ■

The development of the brand new Perfect Pipe system, complemented by frequent appearances at international trade fairs, aroused interest in Grafe Beton right from the start. In 2013, the business ventured into the manufacture of wet-cast concrete pipes for the first time. The experience acquired paved the way forwards to develop this new cornerstone of concrete manufacturing. Increased demand for superior-quality concrete pipes identified in the home market, and the general trend towards concrete components in civil engineering and espe-

cially in pipeline construction ultimately formed the reasons behind the decision to push forwards with developing a comprehensive Perfect Pipe production process. Together with its technology partner, Schlüsselbauer, the production of concrete jacking pipes with firmly anchored HDPE lining, amongst others, was launched in spring 2014, starting with the diameter DN300 typical for concrete pipes. Perfect Pipe jacking pipes are primarily distinguished by the liners and plastic connectors that provide a closed anti-corrosion system, which is ready for use from the moment they are laid in the starting pit. This eliminates the need to subsequently weld the

individual pipes. The connector with tilting lip gaskets ensures that pipes are tightly sealed.

The plastic connector is protected by a pipe joint, just as in pipes for trench construction. This type of pipe connection has been tested for permanent tightness at 2.5 bar (36 psi) and is therefore also approved for use in water catchment areas. In jacking processes, pipe joints are of course additionally protected by the outer cutting ring, which is also gasketed to the next pipe along. The pressure in the installation is transferred by the usual rings in specified strengths. Of course, it is also possible to



One of Tamara Grafe Beton GmbH's four locations – the site in Stölpchen



Since 2014 the Perfect Pipe jacking pipe has been manufactured in Stölpchen

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The HDPE liner is welded to a tight pipe liner



HDPE-lined Perfect Pipe concrete jacking pipes are available from DN300

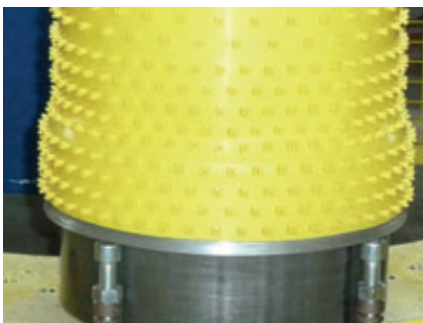
use controllable pressure transmission systems for concrete jacking pipes. For the first time, a lined concrete pipe system with Perfect Pipe jacking pipes is available for inaccessible diameters from DN300 to DN1200, doing away with complex work after pressing is completed, such as welding a liner using robots. After reaching the intended manhole and removing the pipes required for the jacking, the pipe string is ready for operation.

Producing jacking pipes was not originally a priority for Grafe Beton. It was only when it came to finalising the design of the Perfect Pipe production between Grafe Beton and the supplier Schlüsselbauer Technology that it was decided to consider the increasing global significance of this narrow product segment in pipeline construction from the outset. The vast majority of pipes manufactured by Grafe Beton are used in open installations. These can be both wet-cast concrete pipes with integrated gasket and concrete-plastic composite pipes with HDPE liner for use in projects subject to increased chemical attack. For Grafe Beton, it is a matter of preparing to react quickly to two different and often contradictory market trends. On the one hand, not only in Germany is it becoming increasingly common to construct sewage lines using pipes

made out of materials other than conventional concrete or reinforced concrete. On the other hand, a large number of markets are practically experiencing a revival of using concrete pipes as a cast and wet-cast component. This can probably be attributed to the use of self compacting concrete (SCC), which allows a variety of concrete additives to be incorporated, and products generally have a significantly lower water penetration depth than pipes manufactured using earth-moist concrete.

The new pipe production method enables the new pipe manufacturer Grafe Beton to convert to a short-term and project-specific process. Using the same moulds, pipes can be produced with or without liner, whether reinforced or not. Naturally this also applies to connection pieces and adaptor pipes, in addition to standard construction lengths of 3 m. In projects that require increased protection against corrosion, moulds are simply fitted with liner cylinders during pipe production, prior to concrete pouring. These can either be pre-cast according to the specific project, or synchronised with the pipe production so that they are manufactured at the same time, whereby the liner tracks are welded fully automatically. After just two further work steps – the thermoplastic shaping of the ends of the liner cylinders to the subsequent pipe joint, and setting up of the moulds – production continues in the same way as for concrete pipes. Grafe Beton processes gravel exclusively from its own mining areas. Concrete technology is constantly being adapted to the latest expertise - not to mention how crucial this is to maintaining a leading market position in the ready-mixed concrete sector. After the concrete pouring, the pipes usually take one working day to cure in the formwork, before they complete production as a concrete pipe or concrete-plastic composite pipe.

The ability to produce pipes with plastic lining beyond wet-cast concrete pipes allows Grafe Beton to take on future projects that envisage the use of non-concrete materials in initial planning. The aspect of continuous corrosion protection, coupled with the structurally advantageous properties of concrete pipes, leads to the conclusion that concrete pipes – whether with or without steel reinforcement – will regain market share in the future. This may be because there is now an additional benefit in regions with traditionally-established concrete pipe manufacturers, or because only now is this flexurally rigid and robust material being fully leveraged in markets in which concrete pipes have hardly been used until this point. In any case, Perfect Pipe represents an opportunity for the precast concrete industry to bring the added value that comes with pipeline construction back to our own sites. And, as has already been observed,



The sleeves are thermoplastically moulded to subsequently join onto the connectors



Concrete pipes made using liquid concrete are wet-cast and therefore manufactured to exceptionally low tolerances



The concrete is mixed using trucks to produce jacking pipes and poured into the moulds using a pail

After curing in the formwork, the jacking pipes are demoulded the following working day

Perfect Pipe also re-creates the potential for precast concrete manufacturers from various sectors to enter the pipe manufacturing sector.

Grafe Beton is an established medium-sized company in Saxony, with concrete production sites at four locations and its own gravel pits. Each concrete production site specialises in a clearly defined product area. The many years of experience with materials and products are of course shared within the network of sites. Nevertheless, employees on each site possess their own specialist expertise that makes such a wide product range possible for a medium-sized

company, ranging from ready-mixed concrete, road construction and landscaping elements, and retaining wall construction and civil engineering systems, to a highly diverse collection of components with the quality of exposed concrete. Other than Saxony and neighbouring states, the company often delivers to customers in the Czech Republic and Poland. Grafe Beton sees its entry into concrete pipe manufacturing with Perfect Pipe as an essential step in expanding the precast concrete sector. This should enable the company that was established in 1903 to secure this positive trend for decades to come.

FURTHER INFORMATION



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For future projects, the Perfect Pipe jacking pipes are produced to a nominal width of DN300 in 2 m lengths



At Grafe Beton, wet-cast concrete pipes are manufactured for open construction up to a nominal width of DN1200



The Perfect Pipe jacking pipes on display at bauma 2013 – from presentation to industrial production in spring 2014