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## Variable manufacture for project-related product properties

An HDPE liner with optimized wall thickness and a wet cast pipe ensure protection from corrosion and high static resilience in equal measure in the wastewater pipe which has now been successfully launched onto the German market. The two properties of corrosion protection and durable statics form the essence of the new piping system, regardless of different pipe contours or different installation scenarios. Dependent on individual project specifications and the general product policy of the pipe manufacturer, Perfect Pipe products can be manufactured with or without a prebed, with or without a bell joint, for a trench design or for pipe jacking and, of course, with or without steel reinforcement. The manufacturing technology used in the process is extremely flexible. Consequently, several of the characteristics mentioned can also be combined in a manufacturing concept. In this report we will look at some variants in closer detail with regard to their special features in the tough competition of the piping market.

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### Prebed Perfect Pipe with identical link element

The contours of the prebed pipe with a middle notch and an even stacking surface on the vertex of the pipe determined in the pipe geometry design phase prove advantageous in manufacturing and installation practice.

Both in the manufacturer's warehouse and during transportation and storing at the construction site, the prebed pipes can be ideally stacked and secured. Cast in lifting

anchors enable consistent, professional product handling from the factory into the pipe trench. The central notch in the prebed pipe in particular is welcomed by the executing construction companies. In addition to the intended beneficial impact on pipe statics by the deflection of the acting forces into the base, they appreciate the now acceptable, comparatively uncomplicated bedding of the pipe.

A simply compressed plane is sufficient in order to lay the pipes without difficulties, even with a low pipe gradient which therefore needs to be realized exactly. This pipe joint which is executed identically on both sides in this variant saves the excavation for



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protruding bells as are necessary for bell pipe joints. But it predominantly means that the link element customary for the manhole connection only needs to be provided in one design. The identical link elements are connected to the manhole with the same connectors used for the pipe-pipe connection. Defects in pipe laying such as insufficient backfilling or subarches due to insufficient bedding or buoyancy protection cannot occur at all due to the prebed pipe geometry. Possible shearing loads are absorbed by steel bolts encased in plastic used in the base region of the pipes.

### Prebed Perfect Pipe with central bottom notch and bell joint

In contrast to the pipe initially described, this variant with a spigot and bell joint has a defined direction of installation, which must predominantly be heeded with regard to the shaping of the link elements. The corrosion-resistant pipe connection is also manufactured with plastic connectors with tipping lip gaskets. These pipe connectors can be installed both in concrete plants and also on the construction site. The connectors permit angulation of the pipes in the customary range for concrete pipes with integrated gaskets.

Due to the flexibility of the connectors which corresponds to a double joint, there is no excessive stress in angulation either



Perfect Pipe pipes with HDPE liner before installation in 3 m effective length, as an adaptor pipe with an individual construction length and as a 1 m link element



Rapid installation progress by simple and practical compression of the pipe zone



In pipe jacking, the connection means significant acceleration of installation progress

and thus no longterm resulting fatigue of the gaskets used. Shearing loads are absorbed by the concrete bell and spigot in this type of pipe. The geometry of the prebed pipe also simplifies handling and installation in this execution.

**Perfect Jacking Pipe for quicker completion of micro-tunneling jobs**

The connector - a plastic coupling with pre-mounted gaskets - constitutes a quickly

and easily achievable connector which offers improved installation performance compared to the pipe systems which are customary today, especially in pipe jacking. In the past, remedial work to produce a consistently corrosion-protected pipe was frequently necessary for pipes with liners after completion of a jacking stretch which could only be performed manually with considerable safety precautions or - for smaller nominal widths - only with the use of very sophisticated equipment.



A link element is connected to the monobase with the same connectors as the pipe-pipe connection

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*Simple and safe handling of the Perfect Pipes on the construction site with cast in lifting anchors*



*Concrete pipes can be produced with the same manufacturing technology with prebed geometry as lined pipes*

Thanks to the connectors used at Perfect Pipe, an operational pipe with a tight and corrosion-resistant pipe connection is installed after lifting a pipe into the start trench and the sub-sequent jacking cycle. This is a revolution in installation and piping practice, especially in the non-accessible nominal width sector. The sophisticated process of the welding of plastic linings is thus relegated predominantly to small, non-accessible nominal widths from installation practice. However, these can of course be used in the case of subsequent repairs or renovations. With Perfect Pipe a product is available for the first time which ideally combines a cor-

rosion-resistant inner layer with the resilience necessary especially in pipe jacking / micro-tunneling.

#### **Practical suitability of Perfect Pipe – comparison of installation situations**

Although the corrosion protection is characteristic for the new wastewater pipe Perfect Pipe due to the firmly installed HDPE liner and the concrete pipe being a structure, with relevant project requirements deviating designs also make sense. In two projects carried out in Germany at the end of 2013 in one case Perfect Pipe pipes were used for wastewater and conventional concrete

pipes for storm drain. In the second project, concrete pipes without lining were used in the same prebed pipe geometry nearby to drain off surface water, while plastic pipes were used to drain off wastewater. With such different requirements on the planning side, it is crucial for the pipe manufacturer that both pipes with a fixed HDPE liner and concrete pipes without lining can be manufactured with the same manufacturing technology. In this case, both variants are supplied with or without a steel reinforcement cage (manufacturer: Beton Müller, [www.beton-mueller.de](http://www.beton-mueller.de), comprehensive production report in BWI 02/2013). In the case of a wastewater pipe with a HDPE liner both the yellowcolored liners and the contrasting black pipe connectors proved beneficial for subsequent inspection work.

Final inspections of the pipe connections, manhole connections and lateral inlets into the pipe were performed with a camera. Relevant leak tests in the string laid proved successful without any shortcomings. The simple installation of the prebed Perfect Pipe was appreciated by the commissioned construction companies in both cases. In addition to the simple embedding, it is first and foremost the rapid backfilling and reliable consolidation of the pipe trench which the construction companies appreciate. And it was predominantly the simple installation and thus the early completion of the construction measures that were convincing for the principals, in addition to the basic product characteristics initially described. Consequently, further installation of the new Perfect Pipe wastewater pipe is approved by all sides. ■

#### **FURTHER INFORMATION**



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