

IMPROFIL

Krah Open House:

Performance of new
KR800-MAX

Potable water plant:

Pipe containers as
storage tanks

Intake pipeline:

96 m in DN/ID800mm
in Finland

**New production history
for large plastic pipes**

written by KRAH

Dear reader



Mr. Alexander Krah in front of his hometown, Daaden in Germany

The new year started full throttle - we developed a whole new design for our ImProfil. We hope you like it! But not just our design changed... Krah Pipes and Krah Machinery are now two registered brands, which is quite an achievement. We also opened another company which is Krah Pipes GmbH & Co. KG, Germany. It has been active since the beginning of 2017 and will start with global pipe marketing very soon. We also thought it would be time to give something back to our global pipe producers: Krah Pipes GmbH & Co. KG will award certificates to Krah pipe producers which certify that the pipes have been produced according to current Krah pipes guidelines and in the best quality possible. Read more on page 18.

Krah Machinery and Krah Pipes will start a Social Media campaign – even if I have a low opinion on Social Media networks – but I might just be too old for it. You will find regular postings and background information on how Krah works on Social Media: Facebook (@krahpipes), Instagram (@derkrah), LinkedIn (Krah) and YouTube (Krah).

Also, in March there was lots going on in the Krah factory in Schutzbach. We had an open house from March 21st to 22nd. You could say that new pipe production technology was written here - we made pipe production even easier with an even higher production output and less costs for you. You will find a detailed report about this event on pages 3 and a more technical report on pages 19-20.

All in all, our "ImProfil" will now give you a better insight on how Krah works - as technology and as company. Furthermore, should you require any more information for any topic in this newsletter please feel free to send an email to **improfil@krah-pipes.de**

Now enjoy reading and let us know should you have any wishes or contributions for the next issue of ImProfil which should be published around June.

Best wishes,
Alexander Krah

Open house at KRAH



Our technical manager Mr. Sven Jürgens with our long-term customers Mr. Glen Sabin and Dr. Jason Shingleton from Polypipe, UK

On the 22nd and 23rd March Krah had an Open House in their factory in Schutzbach, Germany.

Global customers and interested companies were invited for a test run of the machine with its new features and advantages. While watching the machine running, they were able to understand how Krah technology works and which advantages it implicates.

In our newly designed "Krah-Lounge" we had a little buffet in the factory with typical German "Schnitzel" and "Currywurst", prepared from a local butcher. When lunch was done our colleague

Marina used our "pipe bar" from the K exhibition 2016 to mix some cocktails for everyone. The design of the new lounge took us a lot of time and patience, but in the end

we went from a „naked“ storage room to a nice, comfortable lounge.

Our technicians and designers in the plant construction department worked hard on the development of this machine and were happy to see that all customers - and the board of management - were really impressed by the development of the machine compared to the first edition of the KR800, which was developed in 2014.

We have already built 3 of these new machines and are looking forward to build many more. It only implicates advantages for the customer.

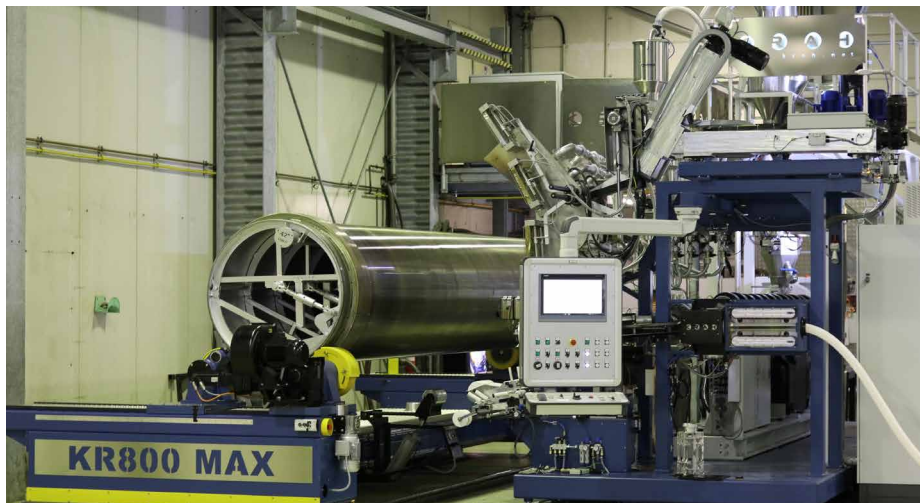
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Customers admiring the many pipe samples outside the factory

Live performance of the new KR800-MAX plant



Test run of the new machine

Krah high-performance production plant KR800-MAX was successfully accepted - Pipe of DN/ID1000mm, SN8 was extruded with 1300kg/hr

In the course of a machine acceptance more than 20 international companies visited the little village Schutzbach in the Westerwald, Germany – where profiled pipe production plants have been successfully developed and produced for more than 30 years – and are subsequently put into operation by Krah Advanced Technologies GmbH – shortly KAT GmbH.

But with this new machine the self-defined performance target was clearly exceeded. The production performance has been steadily

increased throughout the past years. This time the designers even impressed the management board and all customers / stakeholders, as it has been managed for the first time ever to produce a profiled pipe DN/ID1000mm, SN8 according to ISO9969 with bright, co-extruded inner layer incl. electro-fusion and spigot with a production output of up to 1500kg/hr. As acceptance material the HE3490LS and HE3492-LS-H from Borouge / Borealis were used for the inspection-friendly inner layer. The customers were extremely impressed when the whole pipe was finished in just a few minutes, including socket and spigot.

The extrusion heart of the new plant KR800-MAX consists of a

KraussMaffei extruder 125x36D and a self-made co-extruder which was effectively included into the plant. Every extruder is equipped with a gravimeter for two components each. The in-house control system controls and visualizes the whole plant. The gas and energy consumption can be pursued precisely on screen.

In general the machine appeared very tidy and open for additions. Additions may include the development of other materials like reinforced ties or the production of square profiles. Generally round profiles are extruded since there have been a lot of optimizations in the past weeks / months to produce pipes in larger diameters even easier while simultaneously fulfilling the required stiffnesses. The maximum profile diameter is 110mm for round and 80mm for square profiles. There is a special profile for outfall and sea water intake line applications, which make the usage of such pipes for these applications even more cost-effective and save.

The customer will solely produce outfall pipes for the first 1.5 years which are connected to each



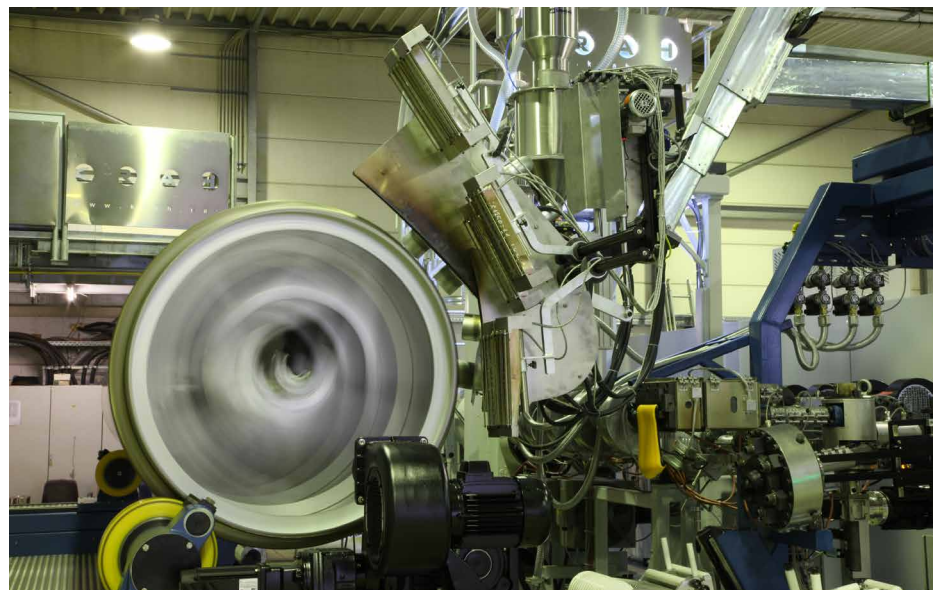
operator. Via RFID chips and cards nearly all product-related dates can be measured and saved per pipe, which fulfils the demand for product traceability. With this new production plant KR800-MAX the Krah technology is well prepared for the future and ready to stand against global copy-cats. The customers were highly satisfied and 3 days later the plant was already dismantled and ready for dispatch to the customer in Near East, where it will highly efficiently produce pipes in about 2 months. The installation of such a plant lasts max. 10 working days and doesn't

other by an electro-fusion fitting. Due to the new mass distribution valve the pipe endings are manufactured homogenously with only one die head – the second one will be opened at the required time – thus the start-up waste will be reduced to 5 kg besides the better quality and look.

Another feature of the plant KR800-MAX is the production of homogenous solid wall pipes with a wall thickness of up to 300mm – without any sagging problems and with the above-mentioned high production output. The plant can produce bi-directionally and has been equipped with a special, energy-saving IR-heating.

During the live demonstration the changing from a profiled pipe with SN8 to a homogenous solid wall pipe with a wall thickness of 30mm could be done in only 7 minutes. Besides the high performance the control-, operating and evaluation software has been greatly exceeded, which

is the effect of personnel increase of programmers. The production plant is able to measure, record and evaluate all direct costs like



time, downtimes, gas, material and energy consumption. This can be done per kilo, pipe, day or month. The evaluations are directly shown on the machine or on smartphone and computer through the program "Pontis" – which is the "bridge" between plant and

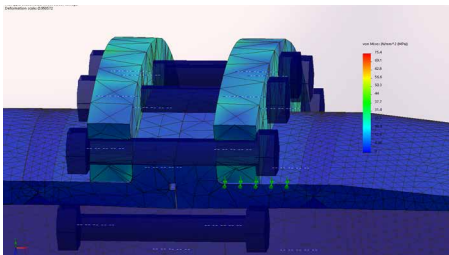
need a fundament which makes the machine very "moveable" and can "follow" pipe projects.

Author:
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CEO Krah Pipes GmbH & Co. KG

Intake pipeline DN/ID800 with submerged chamber of DN/ID2000mm

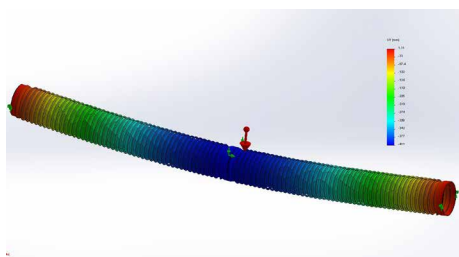
96m of ID800 intake pipeline + ID2000 submerged chamber. Installed partly into a trench to a depth of approximately 3m.

One of our customers from Finland approached us with a request for 96m of SN8 pipes for a project. After the initial price quotations we were asked more technical questions and we actually found out that the pipes were meant for

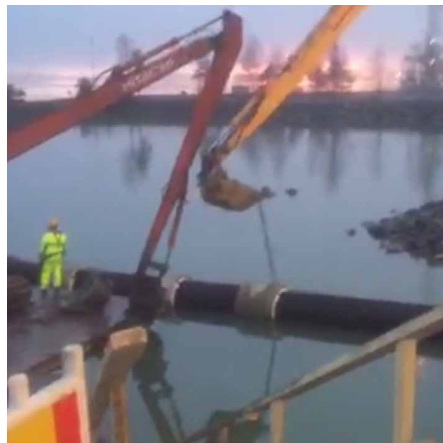


Pics 1-3 : Calculation of the theoretical profile suitable for this project

a intake pipeline. After convincing the customer that the regular SN8 pipes might not be the correct choice for such a project, we were asked to provide a technical



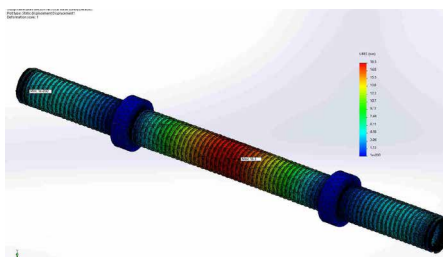
solution for this exact task. As a first step we calculated the



theoretical profile that would be sufficient in such installation conditions. After receiving the customer's approval on the price, we then carried out more thorough analyses of the situation and three FE simulations in order to approve the profile design:

Concrete connection and GRP flanges deflected to max radius of 48 meters (24h parameters)

Pipeline deflected to 48 m radius (24h parameters)



Pipeline afloat with 6kN concrete weights on distance 6m btw the

centres (1 week parameters). After the FE simulations we approved the profile PR54-007.00 (14/4/120) with the following technical parameters given to the construction company:

Total uplift of the pipe: 564,4 kg/m

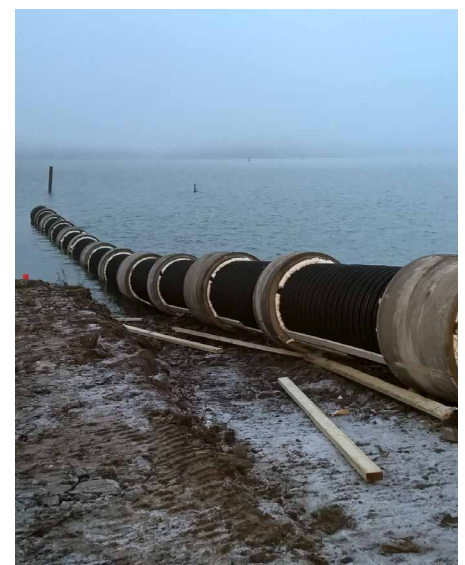
Uplift of the submerged pipe, 100% water filled: 49,75 kg/m

Minimum bending radius in submerging process: 48 meters

Concrete ballast blocks (dry weight): 600 kg/piece

Mounting distance of the ballast blocks on the pipeline: 3meters (between the centres)

Dimensions of the ballast blocks



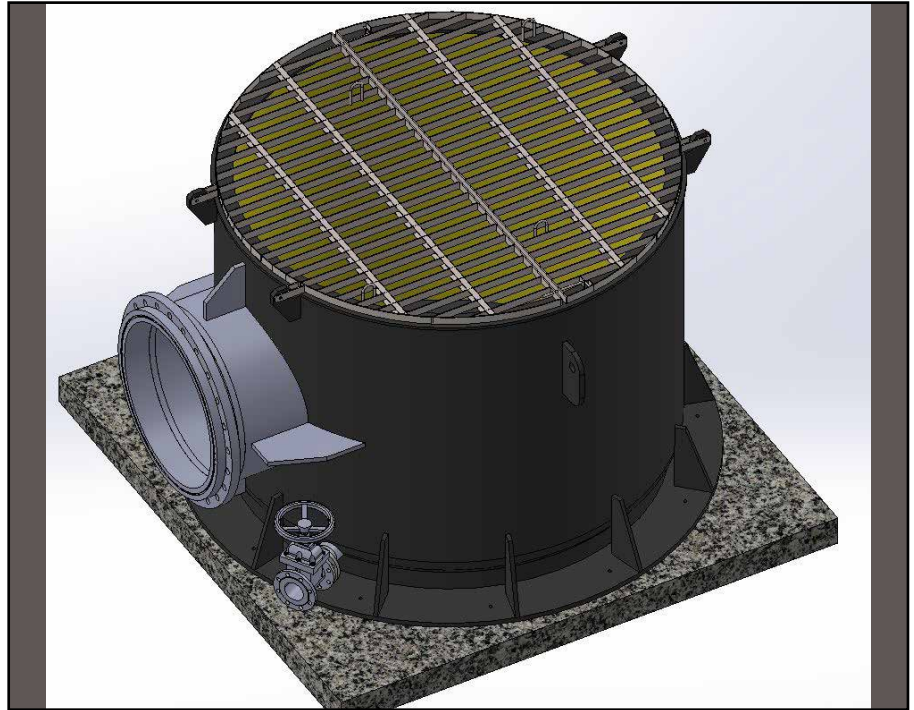
Pic 4 : Sea outfall pipeline led into water

(based on the option chosen by the construction company): inner diameter 938mm, outer diameter 1300mm, width 400 mm

The prewelded pipe together with the ID2000 chamber was successfully sunken in December 2016.

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Construction site in Houghton Regis

Unique storm water solution

Our English pipe producer Polypipe Civils in Loughborough, UK has provided a stormwater attenuation solution for a luxury residential development in the heart of the idyllic Bedfordshire countryside in eastern England.

Renowned developers, Taylor Wimpey, called upon Polypipe to provide an engineered drainage solution, designed to work with a sloping gradient found on site. Set in the countryside town of Houghton Regis, the Regent's Place large-scale residential development comprises of a mix of 180 two, three and four bedroom houses nestled in a tranquil area that offers stunning

views of the landscape. The landscape surrounding the Regent's Place development features a large public open space with limited footprint for drainage design and sloping gradients. Taking on the challenge, Polypipe worked closely with Taylor Wimpey and Consultant Engineers JPP Consulting, to design a KRAH storm water solution, incorporating staggered legs to take requirements and adopted elements laid out under Section 104 agreement for approving site conditions into account that also met site water company, Anglian Water.

The attenuation tank supplied for the Regent's Place project

boasts a 3m diameter offset RIDGISTORMCheck Vortex Flow Control Chamber which controls discharge water from the tank at an agreed rate of 10l/s, so the local watercourse is not overwhelmed. To control additional flow when required, the chamber also features a penstock flow control.

Project ValPolypipe supplied over 500m of Ridgistorm-XL to form 14 pipe runs in 2100mm diameters. Polypipe's technical team engineered and designed the pipe to ring stiffness SN2 to meet the ground conditions, burial depths, native soil pressures and loading on-site. The system was tested to pass required deformation and buckling checks in accordance with BS EN 1295-1.

To accompany the pipe runs, the Ridgistorm-XL system incorporated 34 pre-fabricated modularised fittings which included 90° bends and 'F', 'T' and double 'T' fittings to fit the limited on-site dimensions perfectly.

The socket and spigot nature of these engineered fittings kept jointing to a minimum allowing for easy pipe alignment and speedy installation using electro-fusion jointing. This in turn significantly reduced on-site installation time and cost.

To achieve this closed loop system all pipe and fittings needed to be manufactured to a tolerance of +/- 10mm on any length dimension.

Due to limited storage space on site, manufacturing and delivery slots were planned with minimum safety gaps. This only allowed 3 days from completion of manufacturing to the installation of product.

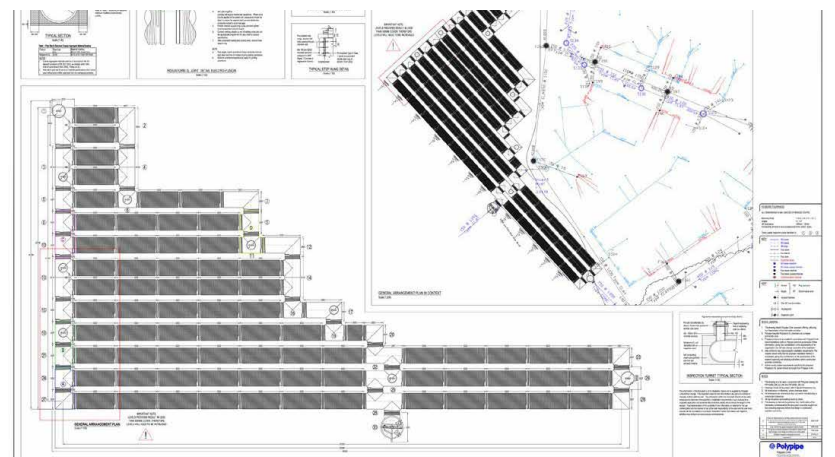
Polypipe has worked on many residential projects in the past and understand the implications surrounding routine maintenance work. In order to make maintenance work less strenuous and overall safer for installers, Polypipe also supplied x10 RIDGISTORMAccess. Manholes in diameters 1200mm and 1800mm. The manhole access assists workmen by providing easy access to a pipeline.

Author: Polypipe Civils Head Office,
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Construction site in Bedfordshire, England



Drawing of the construction site

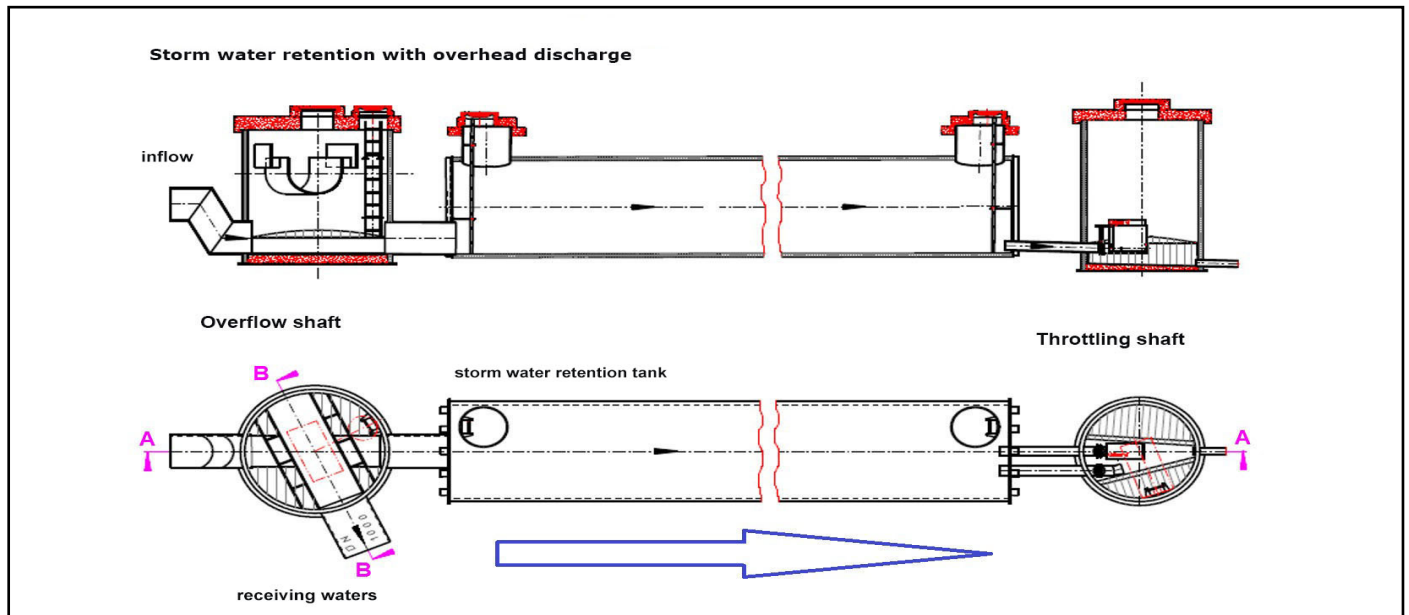


Pipeline with inspection chamber



Excavator

Storm water retention



Not only global warming but also population growth lead to a change of the usual conditions in many areas, which require a reaction to the "new", but also necessary and current building measures lead to changes.

One sector of these changes are building measures which are realized in gaps between buildings or on open spaces (e.g. through sealing) and therefore lead to increasing water quantities which have to be drained, which in cases of average and heavy rainfalls the existing sewerage network cannot absorb. Underground buffers are a widespread solution here, because they don't overload the sewerage system due to a delay of derivation.

In most cases the network operator determines the conditions for the

opening, he defines who, when and how much can be fed to the network, since an overload can lead to widespread damage, e.g. through overflowing.

For such changes the installation of underground restraint systems, especially of storm water retention from PE-HD, has proved, since discharge systems can be realized in a simple, fast and effective way and is therefore a benefit to the whole network, as well as a relief to sewage treatment plants.

In principle this storm water retentions consist of a gully, the actual storage and a control chamber, which limits the inflow. Furthermore an overflow option has to be planned, which prevents an overload of the storm water retention and can drain the rain

water into a dry well without any damage.

The ATV worksheet A 128 is decisive for measuring and designing rainwater drainage systems in the catchment area of water treatment plants. Storm water retentions (SK) in a rainwater / mixed water system are discharge facilities with overflow in waters. These special buildings are built in rainwater and combination sewers due to economic reasons. If the discharge systems aren't measured and designed according to the technical policies, high dirt loads can get into the waters during rainfalls and put a heavy strain on them. The objective of mixed water treatments is the best possible reduction of total emissions from the sewer system

and treatment plant. Sewer system and treatment plant are connected and have to be coordinated.

To design a storm water retention effectively and sustainably the decisive evaluation parameters have to be defined:

h_{na} - long-time average height of rainfall

The long-time average height of rainfall is a location-dependent factor and has a considerable influence on the exonerative effect of the rainwater reservoirs. With increasing height of rainfall more mixed water gets into the waters. Details of the annual height of rainfall h_{na} can be seen from the German Metrological Service or similar. more mixes water gets into the waters. Details of the annual height of rainfall h_{na} can be seen from the German Metrological Service or similar.

A_u - impermeable total area (fixed/unpaved)

The fixed or impermeable areas have to be carefully determined since they have a considerable influence on the size of the storage volume of the storm water retentions. This applies particularly during the forecast calculations for prospective construction or industrial areas. It has to be critically tested if the estimated areas are appropriate for prospective construction or industrial areas. An area increase

of more than 20% should be calculated in any case.

Q_m - Combined sewage flow

The combined sewage flow Q_m is the parameter who has the most influence on the volume determination of the storm water retention. It is often unnoticed that the parameter Q_m has to be drawn from the sewer system calculation, not from the sewage treatment plant dimensioning. If a new sewage treatment plant is planned or an existing plant has to be renovated and extended, and therefore has to be measured with a Q_m , which is to contain reserves for a longer period of time (15 – 25 years), this Q_m has to be used in the dimensioning of the rainwater drainage system.

Q_{t24} - Middle dry weather flow

The actual water consumption figures are to be used. The sum of

the dry weather flow from the sewer system usually has to correspond to the annual dry weather inflow of the sewage treatment plant. Within the planning the consumption figures have to correspond to the sewage treatment plant inflow.

By calculating the crucial parameters the required buffer volume results, from which the individual assemblies can be measured and constructed. Under consideration of the local conditions the storm water retention from PE-HD can be manufactured custom-fit, whereby the maximum possible execution is chosen instead of the required execution due to reasons of sustainability. The costs of an immediate volume increase are in no commensurate to extensions works which have to be carried out 25 years later.

The most important formula is $Q_z \leq Q_A + Q_{ü}$, to exclude a collapse of the restraint system.



The version of the storm water retention always conforms to the local requirements and installation conditions:

- Type of restraint (above, middle or on the ground)
- Type of restraint of dirt loads
- Type of throttling
- Type of overflow

The thermoplastic material PE-HD has established itself as material for big volume storm water retention systems since multiple constructive and creative possibilities can be combined with optimum workability, long operating life and tightness of welded systems. The "dissolved" cross section which acts raw material-saving, as well as the almost unlimited recyclability, even

after decades of installation, complement the excellent features.

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Potable water plant of municipal utilities

2 x 150 m³ pipe containers made of PE100 pipe by FRANK FTW- as storage tanks for the new waterworks "Vogelhölzle"

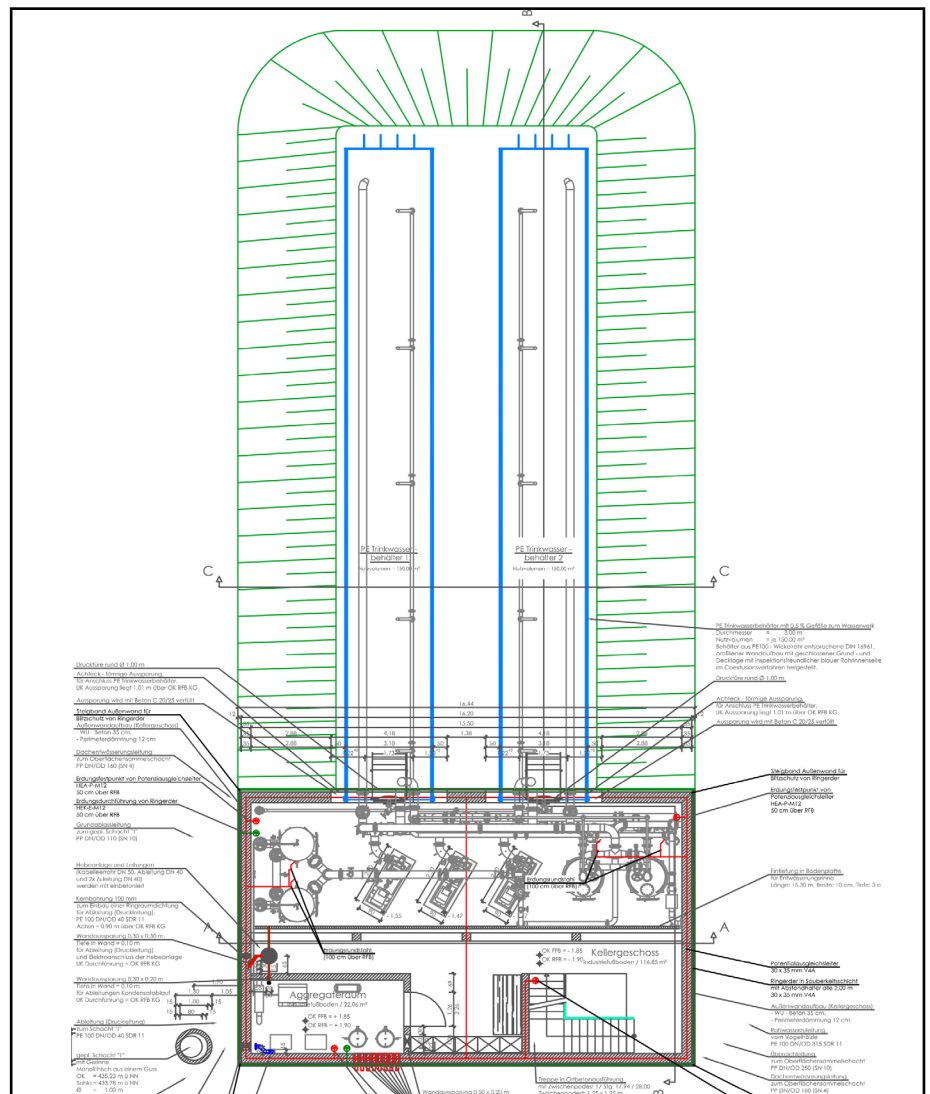
The municipal utilities in Dillingen-Lauingen (DSDL) started to replace the old waterworks "Vogelhölzle", originated in 1962, by a new construction in autumn 2015. The old waterworks were situated in the setting range (ground water protection zone), which is, under current regulations, not permitted anymore. Since October 2016 up to 30.000 people have been provided with drinking water from the new waterworks.

The planning engineering company PfK Ansbach GmbH planned a reinforced concrete building with a pent roof for the waterworks. In this building the complete piping, water treatment (oxidation) and the pumps are stored. The natural water is pumped to the waterworks from two 12m deep wells. If needed, up to 40 l can be conveyed per second. In the new waterworks the water flows through the oxidation and is then stored in two storage tanks. From there the potable water is pumped into an elevated tank and then reaches the consumer.

The two storage tanks, each with 150 m³ capacity, were planned as pipe containers completely made from PE100. The connection of the two pipe containers was already made during the shell construction into the outer wall of the waterworks.

In order to do so, a ground water tight and tensile cross-wall junction of the system FRANK Kunststofftechnik was used. Due to the pliable material behaviour of PE, pipelines or tanks of this material can be connected to concrete buildings without articulation pieces. The following advantages of pipe containers from PE were decisive for the planning:

Fabrication only with materials that are approved for the contact



Pic. 1 : Planning view of the waterworks with pipe container from above



Pic. 2 : Placement of the pipe containers on previously prepared soil

- with potable water
- Easy geometry
- High level of prefabrication; short installation time
- Long operating life
- Smooth surface; easy cleaning
- Easy connection / combination with cast-in-place concrete structure

After public tendering, the order for the construction of the new waterworks was awarded to the company Carl Heuchel GmbH & Co. KG from Nördlingen.

After ordering the two pipe containers from the Frank GmbH the FRANK Kunststofftechnik GmbH in Wölfersheim started the construction documentation. For the technical equipment of the containers there were exact specifications, which

were implemented by a production drawing and released by the planner. Significant equipment features of the two containers were:

Spiral pipe made from PE100 with co-extruded blue inner layer – raw material with approval

Inner diameter DN 3000 – 150m³ effective volume

Construction length approx. 23.6m

End cover and functional wall

Completely factory-made prefabricated and delivered to the construction site in one piece

Pressurized door stainless steel DN 1000 for underwater entry

Stairs with platform from stainless steel 1.4571

Complete piping of the container from the inside with connection flanges of the functional wall – in detail:

- Bottom outlet
- Extraction with strainer
- Filling pipe
- Air tube and vent line from stainless steel
- Inspection glass
- LED lights

After approval of the construction documentation the two pipe containers were fabricated in one piece in the factory. After performed factory approval test by the planner and the client the two pipe containers were delivered with special transport. The containers had an outer diameter of 3,3 m and a length of 24 m.

On site the company Heuchel had already completed the shell construction in such a way that the two pipe containers could be unloaded and transferred with a mobile crane. As support for the

pipes a gravel base layer with sand bedding below was made. During the transfer the pipes were placed correctly into the respective block-outs in the building.

These block-outs were concreted later on.

During the installation the containers were covered with the high-load fabric 'Kortex' by FRANK GmbH. By doing so the buoyancy safety can be assured during the production of the embankment. This was necessary since the construction site was in a flood area.

After finishing the ground and structural works the expansion of the



Pic 5 : Integration of the two functional walls in the outer wall of the waterworks



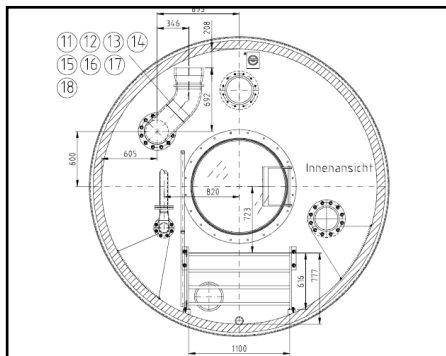
Pic. 4: Functional walls integrated into the plant engineering in the waterworks



Pic. 5 : Finished waterworks "Vogelhölzle" with building and pipe containers under embankment



Pic. 6 : View through inspection hole on water surface



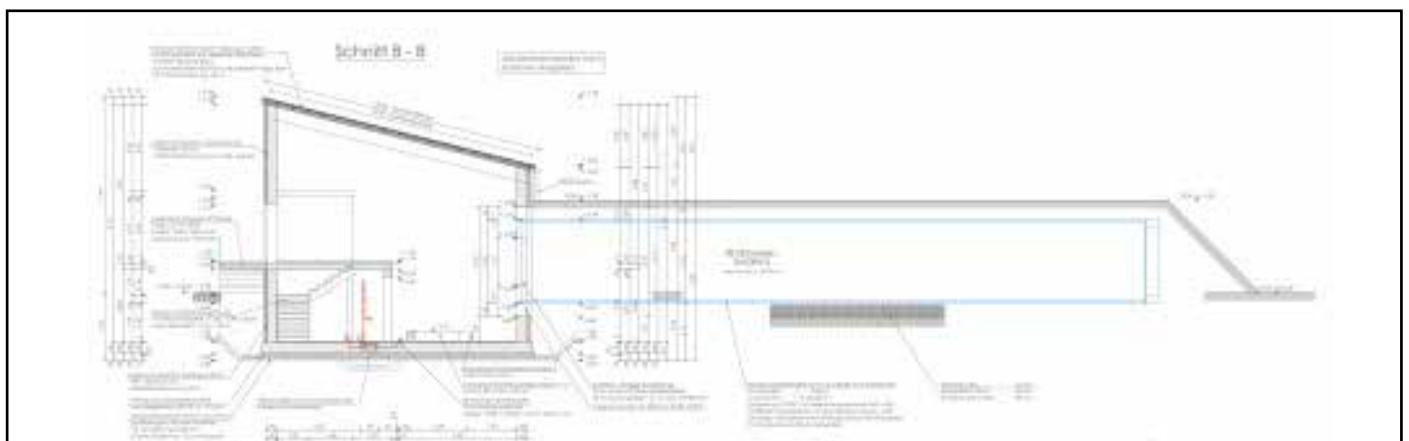
Extract from workplan - View of pressurized door,

waterworks started with plant engineering and piping. The two functional walls of the pipe containers were integrated into the plant engineering through grids, so that an excellent operability could be achieved. Due to the short construction time, avoidance of budgetary overruns and the quality of the construction, the client and planner were completely satisfied.

Partner:

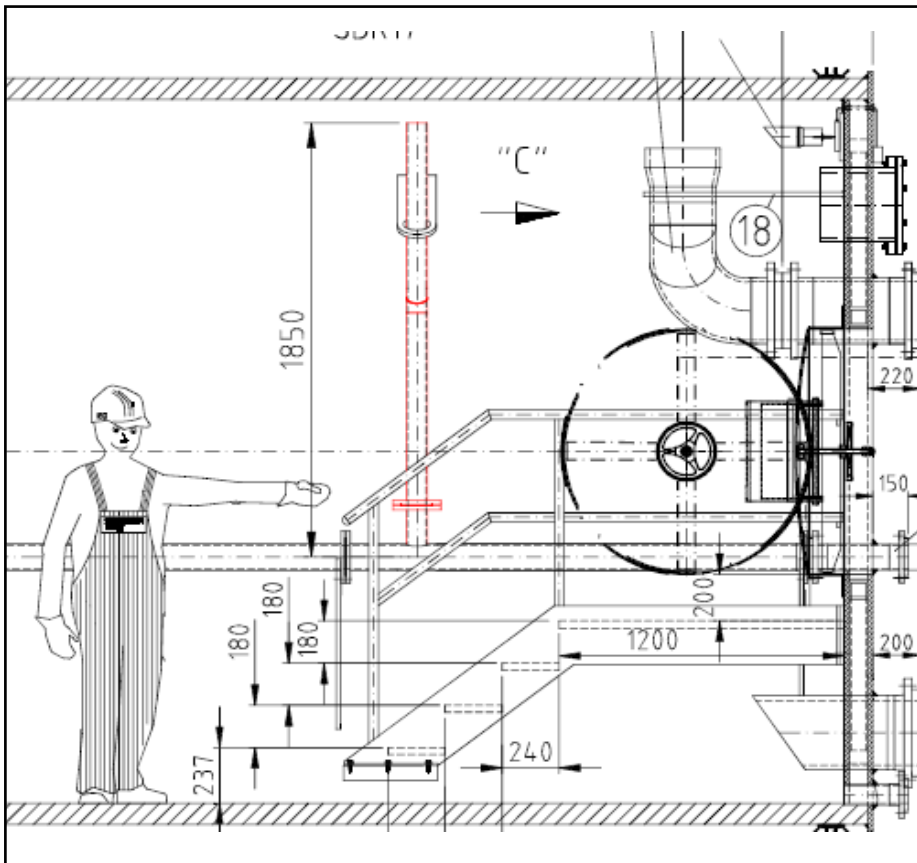
Planner: Engineering office Pfk Ansbach GmbH
 Construction company: Carl Heuchel GmbH & Co. KG, Nördlingen
 Settlement partner: Richter + Frenzel TBU GmbH

For further information: improfil@krah-pipes.de





Pic 9 : Delivery of the two pipe containers with special transport



Drawings : Extracts from the workplan - view and profile with pressure door, overflow, stairs and podest etc.



He was very delighted about the farewell party which had been organized by his colleagues, with lots of presents some days before. "A personal highlight was a treasure chest from aluminium, made in the tool manufacture, with brass inserts to slide it open. Engraved were some figures which represented my 42 years at Krah. When I opened the chest there was a Krugerrand anniversary edition from 2017 from fine gold, a troy ounce. That was a successful surprise for my goodbye into retirement."

Wolfgang Schneider is a primary rock of Krah. When Karl-Heinz Krah wanted to get him for his company "Werkzeug-& Vorrichtungsbau" in 1975 Wolfgang didn't hesitate and accepted a job as tool manufacturer.

Retirement yes, but not ,retired‘

For 42 years he has been loyal to the company Krah. Now the passionate design engineer Wolfgang Schneider has gone into retirement. We interviewed him about his time at the Krah company...

Clear brew, a thundering Corvette and a "Mahlzeit" (German salutation for every day situations; literally translated "meal") any time of day. If you mention these words every employee of Krah knows we're talking about Wolfgang. For the past 4 decades there has always been a loud roaring when Wolfgang drove onto the car park

of Krah. One of his passions are cars, preferably old and special...or especially loud.

However, since February it has been more silent in front of the company building. On January 31st at 5 p.m. Wolfgang clicked "shut down" for the last time ever on his computer. A last soup from the automat in the kitchen, a last chat with colleagues and Wolfgang ends 42 years of working at Krah.

"I'm feeling good", he says while walking over the car park which he has crossed thousands of times. "I'm looking forward to what comes next."

» I turned my hobby into a profession. It was a great time!

"A decision I have never regretted", says 63-year-old Wolfgang. "Since I can think I liked to build things and felt gravitated to technical things. In my childhood I had always wished for an electric motor." No wonder he describes the tasks in the company more as 'hobby' than work.

Karl-Heinz Krah spotted this excitement for technical things and offered him a job as design engineer only a few years later. Initially he

When the things you constructed worked in the end, you were happy

was responsible for drawing Bihler tools. His tasks changed when Krah pursued increasingly to special machine construction and finally sold the complete Bihler area. A highlight in his career was the decisive contribution to the development of the first gravity pipe machine in 2003/2004.

Back then there was lots to fiddle. For a tinkerer like him this was a great challenge.

He described his work as "goal-oriented". "When the things you constructed worked in the end you were happy", says Wolfgang. "As design engineer you work for goals, not tasks." These results are known to many Krah customers all over the world. However, Wolfgang himself is only known by very few customers. His "territory" was always the engineering office in the Westerwald. According to Wolfgang he feels way more comfortable in his office with drawing board and measurement chart than being on a business trip abroad. Still today he remembers one of the few business trips with beads of sweat on his forehead. He had almost missed his flight back then. "I almost got stuck in Russia. That was nothing for



A special passion of Wolfgang are old, fast and loud cars.

me". He always felt very homey at Krah. "Otherwise I wouldn't have stayed for that long. I turned my hobby into a career.

A great time!", so Wolfgang. He now is one of almost 21 Mio. pensioners in Germany. But he surely isn't afraid of boredom: His answer to the question what he will miss most he smiles and says "Actually nothing. I have worked for 47.5 years now and have never been ill for a long time. I now have more time for my other hobbies."

He will continue crafting and building, especially on his home theatre audio system. But what he is most looking forward to are long trips with his Corvette and meetings with other car-fans. And if he'll drive past KRAH during one of his tours, he will be happy to stop by and have a chat with his old colleagues. . .



From now on it will be even cosier in the home theatre. Wolfgang likes to fiddle on his audio system or watch one of his many films - especially with a bottle of local beer.

Certification of Quality & Performance

The global situation of large diameter plastic pipe producers and machine suppliers is steadily increasing. Unfortunately we had to notice that many producers say they are producing Krah pipes only because they produce similar pipes on our machines or even on copies of our production plants.

I have been confronted with so-called "Krah pipes" myself, which neither correspond to our demands nor to international norms. Furthermore I was lead to "Krah production plants" (supposedly produced in China in our name), which didn't even come close to producing sustainable, accurate Krah system components.

Of course we feel flattered when not only our products but also our name 'Krah' is copied which globally stands for good quality. However, we decided to even raise our quality standard and to give producers the possibility to get certified of really having a real Krah approved quality product. And also to have the opportunity to advertise with the certificate on the market. This also serves to integrate a clear quality hurdle in public tenders – products of high quality can be clearly distinguished from cheap products with low quality.

To enable this we have planned an inspection concept together with an external auditor which screens the pipe production company and tests the products complementing to international norms.

Parts of the annual testing are:

Condition of the production means (production plant)

Inspection of machine by maintenance plan / maintenance intervals

General condition of production plant and work conditions of employers

Testing of the quality control system and if it corresponds to the current requirements

Inspection of the quality laboratory (Equipment, test interval and maintenance)

Random sample testing of the incoming goods inspection (raw material) and the required documentation

Qualitative assessment of the used raw material

Random testing of size accuracy of Krah pipe products which are about to be dispatched or are on stock.

Testing of the marking of non-accurate Krah pipes products

Testing of trainings and further trainings for employers with respect to Krah pipe products

and their quality

Successful questioning and evaluation of the management with respect to production quality, production conditions and the social responsibility of the entrepreneur for employers, customers, suppliers and the environment.

Only companies that pass these random tests are allowed to advertise its pipe products with the Krah pipes certificate. The certificate has a standard term of one year and usually ends with the 30th June.

Furthermore the certified companies are named on www.krah-pipes.de and www.krah-pipes.com and in every issue of our newsletter "ImProfil". On many global marketing measures of Krah Pipes Germany explicit indications for the certified companies can be found.

For some companies the test procedure has already begun so we can issue the first certificates already in May 2017.

Alexander Krah
CEO-Krah Pipes GmbH & Co KG

Please see on the next page a sample of a certificate.

★ 2018 ★

Certification of Quality



We herewith confirm that the company

is entitled to use the brand **'Krah Pipes'** and to advertise with it.

This certification is valid until _____
and classifies the company as **'certified by Krah Pipes - Germany'**

All details, methods and elements of the named certification are published and accessible in "Attachment to Certificate of Quality, V.2017".

Schutzbach-Germany, 15th March 2017

Dipl.-Kfm. Alexander Krah
CEO - Krah Pipes GmbH & Co. KG

Dipl.-Ing. Stephan Füllgrabe
3rd party inspector - PLASPITEC GmbH



Krah Pipes GmbH & Co. KG - 57520 Schutzbach / Germany - www.krah-pipes.com

CERTIFICATION

Krah Group sold shares in Henze GmbH

The KHB GmbH (Holding and trading company in the Krah Group) sold their majority stakes in the pipe production company HENZE (Henze GmbH Kunststoffwerk, Josef-Kitz-Str. 9, 53840 Troisdorf, www.henze-gmbh.de) with immediate effect. After Mr. Alexander Krah exited the managing board already in October last year, the chapter

Henze pipe production has been ended completely in February 2017. All shares were sold. Sole managing director is Mr. Wolfgang Fester.

However, shares in the Henze Technology GmbH were increased to 76% to raise HENZE's influence on the world market of production technology. This underlying

transaction is the production and distribution of the global HENZE production technology.

We wish Mr. Fester all the best for the pipe production in the future.

Author:

Alexander Krah

CEO Krah Pipes GmbH & Co. KG

New General Manager of KAT GmbH



Since December 2016 Thomas Bednorz is the new General Manager of the KAT GmbH. Mr. Bednorz has been in the company since his apprenticeship

and understands how Krah works. He did an apprenticeship as industrial clerk at Krah from 2005 to 2008. He then started working at Krah and also studied business administration at a local university.

At the age of 29 he then took over the management of KAT and is since then successfully leading the company. For his previous colleagues it hasn't been a big conversion because they have known him for a long time

already and get on with him very well. He was happy to accept the new job and is looking forward to meet any challenges that he might encounter in his position as General Manager. His colleagues know him as funny and loyal guy who is always up for a laugh.

For further information please contact improfil@krah-pipes.de

Krah Saudi at the “Big 5 Saudi” exhibition



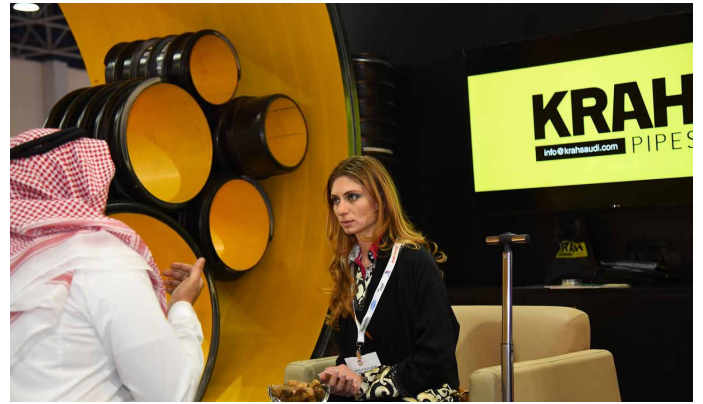
Krah Saudi booth at the Big 5 Saudi exhibition with lots of pipe samples

From the 27th to the 30th March the “Big 5 Saudi” exhibition took place in Jeddah, Saudi Arabia.

It is one of the most important exhibitions for sectors like construction, energy, design and coatings. More than 500 exhibitors from over 20 different countries were present. Of course Krah Saudi took the opportunity and took place. On booth 2F80, which has been creatively designed with lots of pipe samples and information material, our representatives were present the whole three days to advise interested companies with some useful information on the Krah technology.

Due to the pipe samples in different sizes, with different profiles and fittings it was easy to show how Krah works and which advantages it implicates.

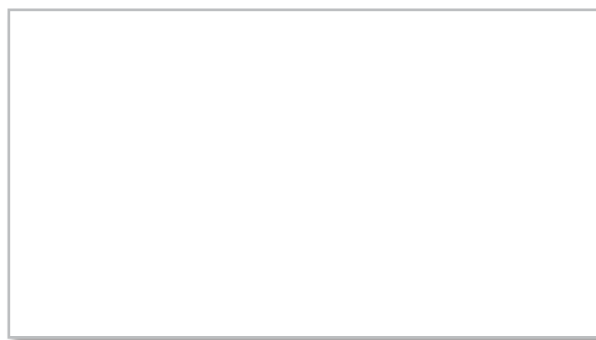




For further information please contact improfil@krah-pipes.de

Get more information here:

www.krah-pipes.de



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