

# Dear Reader,

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Throughout this year, we have continued to strengthen our customer-focused efforts. The success of the KraH Community members, including their good stories from across the globe, confirms our well-thought strategy.

The idea of an „informal“group of companies seemed to be better than a complex company structure. Our self-made and already published handbook is almost sold out (2000 issues left) – soon, we will do the second issue (also in Spanish). The newest family member is the German company „Comtruder GmbH“– this company is a start-up business and focuses on green compounding technology.

At this moment, a production line is being shipped to Manila, Philippines where the official opening ceremony will be held in November 2016. I attended the ground-breaking ceremony and I was impressed to see so many active and young engineers which are willing- and giving all their efforts- to start the production of KraH pipes soon. According to the geopolitical changes at the moment, the markets and the marketing activities are also changing.

This year we will exhibit again on the world's largest plastic trade fair in Düsseldorf / Germany - you are all welcome to visit us and to get drinks and food for free. We are located in hall 16 booth D77.

Best wishes,

Alexander KraH

# Krah Pipes Manila, Inc. holds Groundbreaking Ceremony

## Krah Pipes Manila, Inc. (KPMI) Holds Groundbreaking Ceremonies for New Manufacturing Plant in Dasmariñas, Cavite



*Mr. Alexander Krah and workers of the Krah Pipes Manila, Inc. at the groundbreaking ceremony*

The newly established HDPE pipe manufacturer in the Philippines officially broke ground on its new 2022 square meter production plant at a ceremony on Tuesday, July 5, 8:00 AM. This event was held at First Cavite Industrial Estate in Dasmariñas, Cavite graced by the presence of the shareholders and representatives. The FCIE State Manager, Mr. Rufino Manlayaon has expressed his full cooperation and support to the establishment of KPMI plant by this year. The President of KPMI, Mr. Nobukazu Kotake, German Partner, Mr. Alexander Krah, and one of the respected directors, Mr. Sajid Anonuevo took part in the ceremony. Friends from the political and industrial sector were present as well to support the new endeavor.

Pastor Jerry Andres of Victory Nuvali blessed the event with his prayer of prosperity and guidance for this new venture and it was

followed by the welcoming remarks that were given by Mr. Alexander Krah who came all the way from Germany to deliver his speech.



*Pastor Jerry Andres of Victory Nuvali blessing the event*

“Out of all the countries that I have had business with, my most favorite is the Philippines. For this is the very first joint venture that I ever had in Asia.” said Mr. Alexander Krah at the ceremony. “And I will do my best to make the plant and the business successful in the coming months.”

As the country continues to improve its anti-flooding programs and irrigation systems, Krah Pipes Manila, Inc. has a very good standing in providing solutions for the said problems of our society.

Another brief words from the President of Krah Pipes Manila, Inc., Mr. Nobukazu Kotake were expressed: “With the technology from Germany, manpower from Philippines, and quality of Japan, we will make a very fruitful soil for a sustainable business in the country.”

# Krah Pipes Manila, Inc. holds Groundbreaking Ceremony



Mr. Nobukazu Kotake explaining the purpose of KPMI



Mr. Nobukazu Kotake explaining the purpose of KPMI



The time capsule which was buried during the event

The burial of the time capsule which holds a newspaper of the current day, Filipino, Japanese and German coins and business

cards of the shareholders were put into the ground by Mr. Rufino Manlayaon, Mr. Alexander Krah, Mr. Nobukazu Kotake and Mr. Sajid Anonuevo as a tradition. This symbolized the first ground movement which shall mark the beginning of the construction of the new building.



During the ceremony

“God is helping the people, who help themselves. So, today is the start of a long and extensive work. “ said Mr. Alexander Krah, as he closed the ceremony with his words of encouragement while he challenged the whole KPMI team to push to the extent of their limits towards success. And this beginning of extensive work was accompanied by a very nice and generous meal.



Mr. Alexander Krah talking about the ceremony

# Krah Pipes Manila, Inc.

## holds Groundbreaking Ceremony

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### **Background of the project:**

The plant will stand on an area of 8,000 square meter and will hold up to 100 employees. The plant promises to over-exceed the local requirements for environmental, health and safety standard practices as it produces a complete system of large diameter pipes (including manholes, fittings, jointing systems, etc.) ranging from 400mm to 4000mm out of Polyethylene and Polypropylene material with a lifetime of 100 years.

KPMI aims to bring in the most advanced technology for HDPE large pipe production from Germany to Philippines through intensive and hands-on trainings in order to be the number one choice for “green“ solution to the country’s existing and emerging problems on drinking water distribution and containment, wastewater, sewage, flooding and irrigation towards an environmentally friendly and sustainable future.



**1.Nobu, to start with an easy question: You are from Japan. Why did you go to Manila and for how long have you been living there?**

I came to Manila as civil engineer of a Japanese general contractor in 1996. I used to work in Singapore and Malaysia before here and of course in Japan as member of Kajima corp.

**2.)That sounds interesting. Can you notice any differences in the Philippine business life compared to Japan?**

I feel not so much difference between Japan and Philippines business but people are different. Philippines are more friendly and have more hospitality, but they aren't as punctual.

**3.)And what do you think will be challenging in KPM (Krah Pipes Manila) ?**

I want to establish KPM as top company of plastic pipes. We have a small demand for large size plastic pipe now. We need to make effort to announce to people.

**4.)Are you looking forward to these challenges?**

Yes. I want to challenge it strongly. We shall inform merit of Krah pipe to government ,developer, construction company and consultant

**5.)How do you see the market in the Philippines and in South East Asia?**

Large plastic pipe market could glow. Many people don't know merit and usage of large plastic pipe. We shall produce demand for large plastic pipe.

**6.)In which field of business did you work before?**

I only have experience in the construction field in Japan, Singapore, Malaysia and the Middle East.

**7.) Nice. Have you ever had experience with German business partners before?**

No experience with German business, but I know German product quality is very good.

**8.) What is your favourite memory during your time with the Krah-Group so far?**

All Krah people are friendly and kind and humourous. Especially the Boss of the Krah family. I was very happy when I attended last year's Community Meeting in Italy.

**9.)That was indeed very special. As international business partner, what languages do you speak?**

I can speak only Japanese and English. No Philippines language.

**10.)Impressive! Now we've almost finished our interview. But there is one more question: Out of all the "member countries" of the Krah Community, which one would you like to visit the most? Maybe we can arrange the next Krah Community meeting there ..**

Germany of course.

## Sea outfall project in Stockholm, Sweden

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For a power plant in the capitol of Sweden a sea-outfall pipe was planned originally in concrete. The construction-site is located directly at the ferry-harbour in Stockholm.

Because of the impressive product-properties and the professional design the German Henze GmbH convinced the client to use a helical extruded polyethylene pipe with the diameter DN/ID 3400 mm. As part of the overall project also a provisional pipeline DN/ID 1400 mm was necessary for crossing a brackish water basin.

The DN/ID 3400 mm pipes are designed with a strong solid wall part and a reinforced profiled wall structure, so that the total wall thickness reached 180 mm and the outer diameter was ca. 3760 mm. The profiled wall is specially designed for filling with concrete during installation at site. The additional ballast ensures that the pipe-system can be launched and submerged in a safe and easy way. Also the DN/ID 1400 mm pipes are designed similar to a wall structure - with a strong solid wall part and a reinforced profiled wall structure.

The complete project covers around 135 m of DN/ID 3400 mm pipe and furthermore 100 m of DN/ID 1400 mm.

The used PE 100 provides excellent physical and mechanical properties and guarantees the required life-service time of more than 100 years!

The pipes are manufactured in 5 m lengths at

the pipe factory of Henze GmbH in Troisdorf, Germany. All pipes fulfil the requirements of national and international standards. Especially considered are:

-DIN 16961 “Thermoplastic pipes and fittings with profiled wall and smooth inside”

-DIN 16917 “Pipes and fittings made of thermoplastic materials with profiled wall and smooth pipe inside – Large pipes over DN 1200 for underground installation”

For the production of the special pipe diameter a tailor-made Krah steel mandrel is used to guarantee the required tolerances and the smooth inner-surface. All pipes are produced with light and an inspection-friendly inner surface.



*Pipe production / helical extrusion process*

# Sea outfall project in Stockholm, Sweden



*Pipe after dismanteling*

After production of the DN/ID 3400 mm pipes Henze joint the pipes homogeneously to 15 m and the DN/ID 1400 mm pipes to 12 m long pipe-elements before final quality inspection is performed and the pipes gets transported.



*Pipe being loaded onto a truck*

The 15 m pipe elements are transported by on trucks to Stockholm and joint there to 45 m pipe strings. The pipe-strings are equipped with flanges at the pipe ends for the underwater-jointing. Engineers of company Henze and Krah were delegated to ensure the correct joining-process at the construction-site.



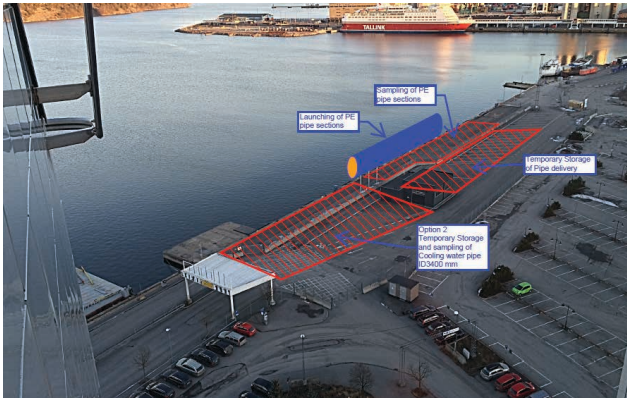
*Pipe leaving the factory*

For the welding and installation a special area of the harbour was reserved.

The Krah-Henze Electrofusion technology was used to guarantee a quick and safe pipe-joint without any losses in strength and stability! The Electrofusion-process for ID 3400 is designed according the Henze and Krah expertises in large diameter pipe joints. The different welding-zones are positioned in a way that a homogenous welding is ensured.

For the welding the new designed welding-machines of Krah is are used. Two weldings can be performed parallel and in one step only. That saves a lot of time and money at on site. All welding parameters can be entered by barcode and the full welding-process is monitored. Furthermore all welding-data gets recorded automatically

# Sea outfall project in Stockholm, Sweden



Prepared area at construction site at the ferry-harbour



Krah Electrofusion Machine E-Box 44 in use



Joining Pipes by using KRAH Electrofusion

Later the pipes-strings is are lifted into the sea, where the profiled wall could be filled with concrete and the sinking process could start in a controlled and secured way. On the sea-bed the pipes will be placed to final position. The pipes will be placed in their final position on the sea bed. The pipes will be jointed with the integrated flanges at the pipe ends by divers!

More Impressions from the construction site:



Welding to pipe-strings of 45 m



Lifting pipes into the sea



# Sea outfall project in Stockholm, Sweden

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Henze GmbH  
Josef Kitz Str. 9  
53840 Troisdorf  
Germany



*Pipes prepared for concrete-filling of the profiles*

## Krah pipes - protecting life!

Krah Pipes OÜ in Estonia has always been keen on developing out of the box solutions and thus opening new fields of application for the Krah pipes. No one imagined that a product, developed few years back together with another Estonian company Vesimentor OÜ, would lead the way into a completely new segment for the industry. In 2012 Vesimentor OÜ approached Krah with an idea to produce underground cellars for food & wine storage. The product was released to the market and successfully sold over the years by Vesimentor OÜ.

Sometimes it happens that a completely random event can start a process of development one just cannot expect. At a meeting during one industry fair a random question was asked. And after a short consideration of possibilities the answer was – yes. This was the start of a completely new product – a bomb shelter. A design that is meant to be completely different from the conventional options. A bomb shelter that is:

- Completely water tight
- Has a small weight
- Mobile
- Can be installed really fast
- Can be relocated after usage
- Is repeatedly usable
- Has vast number of options when compiling the shelter system

The first of the shelters was manufactured for testing purposes in 2014 and during the year many different tests were carried out. Amongst them distant shooting with 155mm

howitzers, short range bombardment with 81mm mortars, locally planted shells (up to 120mm) and explosives (up to 54kg). During the military exercises also 500lb aviation bombs dropped and the shelter was used as a target for the practice. The shelter was equipped with analyzers for pressure, sound and vibration during the testing and the results recorder in order to understand the effect of the explosions to the people inside.



*Soldiers using a pipe as shelter*

We can proudly say, that the shelter survived all these tests and is still buried in the shooting range waiting for the next round of weapons aimed at it.



*Pipe with sleeping accommodations*

## Krah pipes - protecting life!

Our scope of supply of the shelters includes special purpose modules of which every one is designed for a certain purpose, for example including but not limited to sleeping module, kitchen, washing room, toilets, warehouse, coldroom/freezers, technological support room etc. In addition to that a completely new special purpose module can be designed according to the customer requests.

Each module is usable as a separate shelter or it can be used as a part of a larger shelter system, compiled according to the requests of the customer. In addition to standard equipment auxiliary systems like CBRN protection, air and water purification systems etc.

All standard modules can be transported using regular trucks – the outside dimensions and the weight of the modules correspond to all legislative norms on regular road transportation. The weight of the standard modules is 2-3 tonnes, so even excavators used for digging the installation trench, can be used for loading and unloading the modules. It takes about 1,5h to install one standard module, this includes all the operations from arriving to the construction site and leaving from there.

The standalone shelter module or the more complicated shelter system can be easily relocated, when the services of the system is not required any more in a certain location. The possibility the repeatedly use shelter in different locations is one of the advantages of this type of system. The number of the installation cycles is not limited.



*A buried pipeline used as access tunnel and bomb shelter*

The bomb shelter and many other military related products are marketed and sold by Terramil OÜ, a joint venture between Krah Pipes OÜ and Kristo Kirs, the founder of Vesimentor OÜ. You can find more information about our products at [www.terramil.ee](http://www.terramil.ee)



*Bomb shelters can be easily relocated due to the low weight*

# Comtruder

## Energy savings in compounding technology

### Energy savings up to 33% - New innovation in the compounding technology!

In September 2016 the Comtruder GmbH, based in Schutzbach, Germany, put the first compounder “ECO 800” in operation.

The Comtruder GmbH is a successful start-up business in the field of plastic technology and mechanical engineering. The CEO Ms. Lelde Muizniece is looking forward to a bright future for the company. The company will compound various plastic materials as well as sell compounding plants worldwide. First international contacts have already been made.



*The general manager of Comtruder, Ms. Lelde Muizniece in front of the compounder*

The new technology shows significant savings in the energy-sector. Recently produced compounds show an energy saving of more than 30%. The energy input is displayed on the screen of the machine so that it can be continuously monitored and serve as a reliable proof.

The technology is legally protected by its patent application “DE 10 2015 014 865.6 Mehrwellige kontinuierlich arbeitende Misch- und Knetmaschine” and can only be used and sold by the Comtruder GmbH.

Differences between the conventional and our new process technology:

Certain multi-mix process screw elements feature the required effects through their special design and quadruple threading.

Our novel and unique multi-mix process screw elements are designed to increase the mixing effect. The new multi-mix elements have special design variants which are basically designed combining symmetry or asymmetry together with differently milled surfaces of the screw crests, and different screw gaps, hence the required melting and mixing processes can be realized considerably better than with the conventional kneading and mixing systems. Consequently, the double kneading and mixing power is reached due to the design of our new multi-mix process elements while energy remains saved.

Compared to usual kneading blocks, the dispersal and mixing force is especially increased by the asymmetric formation of the elements and the increased surfaces of the crests of screw elements.

Additionally, the tips of the elements are increased in such a way that the double dispersion is achieved without the

# Comtruder

## Energy savings in compounding technology

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enlargement of the screw elements.  
For instance: During the compounding of HDPE MFI 0,3 with filler an energy saving of 33.8% was achieved.



*All kind of commodity plastics and technical compounds.*

Employees of the Comtruder GmbH can be met at the K fair in Dusseldorf, Germany at the booth of Krah / KHB group (Hall 16, booth D77).

# Reducing the effects of flooding in the Philippines

**On the 22nd September the annual DPWH Research Symposium took place at the GT Toyota Asian Cultural Center, UP Diliman, Quezon City.**

This year's event was called „2016 Research Symposium: providing infrastructure that improves quality, traffic and road safety“. It was spearheaded by DPWH Bureau of Research and Standards (DPWH-BRS). The symposium was graced by Mr. Raul Asis, DPWH Undersecretary and Ms. Judy Sese, DPWH-BRS Director. Over 200 enthusiasts in the field of engineering and research attended the said event. Mr. Sajid Anonuevo, CEO of Krah Pipes Manila, Inc. , also held a presentation at the event. His topic was how to stop flooding in the Philippines.



*Mr. Sajid Anonuevo at the DPWH event*

During the first week of July 2016 yet another unusual 3-hour heavy rain surged in the main land of Metro Cebu , which caused severe flooding, “gridlock” traffic and left thousands of civilians stranded on all its major roads. The rain started with a weird, unusually loud thunder and lightning,

described as heaviest so far since the state weather bureau announced the start of La Niña.



*Flooding in Cebu*

This is not only evident to Cebu but mainly to most parts of the country and its major cities, since one of the most flood-prone countries in the world is the Philippines. There have been over 60 reported major floods in the country in the last ten years. These natural disasters affected nearly 14 million people and about 700 lives were taken. In addition, the recorded damages were estimated to be worth over \$400 million.

The economic center of the Philippines, Metropolitan Manila, is considered to be the most vulnerable city in terms of flooding. Due to its geographical location, low elevations, fast growing infrastructure and high density population, Metro Manila has a more significant exposure to flooding impacts than most other parts of the Philippines. Due to the rapid urbanization; newly constructed reclamation sites surrounding the metro; nearby forestlands in the watershed area that have been transformed into paddies, grasslands, fruit or chards or dry fields,

# Reducing the effects of flooding in the Philippines

villages, residential subdivisions and extensive pig farms; flooding became prevalent even in relatively high places in Quezon City, Makati, Manila, Paranaque, Muntinlupa, Pasig, and San Juan today mainly due to substandard housing infrastructure problem.

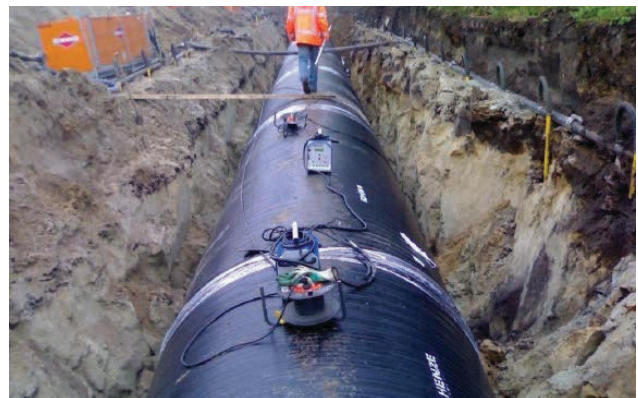


*People having to sit on their roofs during the flooding*

This inevitable force of nature accompanied by poor disaster control measures actually results to health and safety hazards to civilians, stimulates contagious diseases, destroys wild animal reserves, destroys livelihood to the masses, creates infrastructure damages, and causes deaths.

Apparently, most of the government solutions to flooding like the additional and large drainage systems and catch basins are all effective, but for a limited time only. In addition to this fact, due to the material of most sewers and drainage systems we have in the country; which are mostly concrete pipes with high risk in handling, maintenance cost and have a long period of installation; the government is spending more than the actual amount needed to

establish these mitigating systems. What this storm water management plan needs, is a complete system of large diameter pipes with a one-time and no-claim-installation to minimize- and moreover eliminate- the additional problems caused by implementing these improvements whose primary goal is to reduce the effects of flooding and flooding itself.



*Installation of storm water tank in Cebu*

As Krah Pipes Manila, Inc. steps in our native land, it aspires to provide a complete system for storm water management, starting from the design calculation until its installation. This service shall include: avoiding sealed surfaces; soak away application; decentralized storm-water retention tank system with large storage capacity and low maintenance cost; very compact and easy to install water absorbing wells; and a long time tight drainage system with no in- and exfiltration, no root penetration and no pipe blocking system. The system can also provide larger pipes ranging from 400mm to 4000mm with all available fittings and manholes for drainage and sewerage with self-cleaning properties and resistance

## Reducing the effects of flooding in the Philippines

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against high intensity earthquakes with available simulated testing results. It supports environmental friendly water management in all aspects as the system divides the sewage from the drainage. The system also avoids reflow/ backflow to the system coming from the sea-side.



*Storm water retention tank*

Krah Pipes Manila, Inc. serves to provide the complete solution to help the country and its population. The manufacturing process will be done in the country and all the parts will be produced in here, as well, which makes it a more cost effective choice. We will give assistance to the local engineers during the design stage up to the building process to ensure a one-time and sustainable system that will benefit the authorities and the masses for a long period of time.

**In the next issue of our “ImProfil” there will be a detailed report about the function and building of a storage system, including the technical design.**



# Tender text for sewage pipes made out of Polyethylene

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Public and private tenders are carried out to obtain as many comparable offers for the deliveries and services named in the tender as possible. The tendering authority orientates towards national and international requirements. The responsible engineers are facing the challenge to consider technical and economic aspects equally.

During the development of the tender texts a close cooperation with the product manufacturers is useful to integrate latest innovations which the market creates year after year.

Subsequently you will find an exemplary tender text for a sewage pipe made out of modern polyethylene.

## **1. Preamble - Sewer pipe made of PE-HD Helical extruded pipes: (pipe delivery / pipe installation and welding of pipe-joints)**

1.1 Because of existing boundary conditions a High Density Polyethylene of third generation with bimodal molar mass distribution has to be used for all components of the pipe-system. The raw material has to be classified according to ISO 12162 as MRS 10 (PE 100) The raw material has to provide an excellent chemical resistance, abrasion-resistance, impact-strength and flexibility.

1.2 Water tightness of the pipe system as well as safety against root penetration, sewage exfiltration, ground water infiltration has to be guaranteed durably. Therefore all

components of the pipe-system have to be welded homogenously.

1.3 The used PE-HD raw material must be approved for gravity and pressure application - MRS 10 (PE 100). The pipe manufacturer has to provide a certificate for the used raw materials and welding materials according DIN EN 10204 2.2 or equivalent.

1.4 The pipes have to be produced by helical extrusion, made of PE 100, according DIN 16961-1,-2 The pipes, fittings and manholes have to be produced with a coextruded, inspection friendly, yellow inner surface. The pipe production must be inspected by a third-party regularly. The requirements of DIN 16961-2, section 4 must be tested and monitored by permanent internal control. Furthermore a quality-system according ISO 9000 or equivalent should be implemented.

1.5 For all construction of PEHD/PE100 and all welding-joints the DVS Rules and standards, especially DVS 2205 and 2207, have to be considered. Only approved plastic welders are entitled to execute the welding-joints. All welding parameters of Electrofusion-joints must be automatically recorded by the used electrofusion-machine (E-Box 33 or E-Box 44). If for the manufacture of manholes and fittings and other constructions butt-fusion or Extrusion-welding is used, the welding records for Butt-fusion and Extrusion welding must be according DVS 2207-1,-4.

# Tender text for sewage pipes made out of Polyethylene

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1.6 The preferred welding-procedure for all pipe-joints is the Electrofusion-process. The pipes should provide an integrated Electrofusion-socket and matching spigot-end. A barcode with welding parameters must be labelled on the Electrofusion-socket.

1.7 For installation and tightness-testing of the pipe-system the DIN EN 1610 has to be respected. The workforces at site shall be trained and taught by the pipe-supplier in handling, installation, welding and testing the pipes.

1.8 The minimum required wall-thicknesses for diameters until DN/ID 1200 are defined in EN 13476, for larger diameters DIN 16917 has to be considered. Furthermore the wall-thickness and the wall structure including profile have to fulfil the static requirements during installation and the whole life-time. The profile of a structured wall has to be placed above the overlapping-zone of the inner wall during production.

1.9 The pipes and manholes have to be calculated for all load-cases during installation and operation. These calculations have to be submitted to the client for verification and acceptance before starting the installation. The structural calculations have to consider DWA A 127, using an adequate software is preferred.

1.10 Physical properties of the processing pipe material (as granule)

**(See tables on the next pages)**

# Tender text for sewage pipes made out of Polyethylene

<b>1</b>	<b>Preamble - Sewer pipe made of PE-HD Helical extruded pipes:</b> (pipe delivery / pipe installation and welding of pipe-joints)
1.1	Because of existing boundary conditions a High Density Polyethylene of third generation with bimodal molar mass distribution has to be used for all components of the pipe-system. The raw material has to be classified according to ISO 12162 as MRS 10 (PE 100) The raw material has to provide an excellent chemical resistance, abrasion-resistance, impact-strength and flexibility.
1.2	Water tightness of the pipe system as well as safety against root penetration, sewage exfiltration, ground water infiltration has to be guaranteed durably. Therefore all components of the pipe-system have to be welded homogenously.
1.3	The used PE-HD raw material must be approved for gravity and pressure application - MRS 10 (PE 100). The pipe manufacturer has to provide a certificate for the used raw materials and welding materials according DIN EN 10204 2.2 or equivalent.
1.4	The pipes have to be produced by helical extrusion, made of PE 100, according DIN 16961-1,-2 The pipes, fittings and manholes have to be produced with a coextruded, inspection friendly, yellow inner surface. The pipe production must be inspected by a third-party regularly. The requirements of DIN 16961-2, section 4 must be tested and monitored by permanent internal control. Furthermore a quality-system according ISO 9000 or equivalent should be implemented.
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1.7	For installation and tightness-testing of the pipe-system the DIN EN 1610 has to be respected. The workforces at site shall be trained and taught by the pipe-supplier in handling, installation, welding and testing the pipes.
1.8	The minimum required wall-thicknesses for diameters until DN/ID 1200 are defined in EN 13476, for larger diameters DIN 16917 has to be considered. Furthermore the wall-thickness-and the wall structure including profile have to fulfil the static requirements during installation and the whole-life- time. The profile of a structured wall has to be placed above the overlapping-zone of the inner wall during production.

# Tender text for sewage pipes made out of Polyethylene

1.9	The pipes and manholes have to be calculated for all load-cases during installation and operation. These calculations have to be submitted to the client for verification and acceptance before starting the installation. The structural calculations have to consider DWA A 127, using an adequate software is preferred.		
1.10	Physical properties of the processing pipe material (as granule)		
Property	Requirements	Test parameters	Test methods
Typical density	≥ 930 [kg/m <sup>3</sup> ]	Test temperature 23°C	EN ISO 1183
Thermal stability / oxidation induction time (OIT)	≥ 30 min.	Test temperature 200°C	EN 728
Tensile elastic modulus	≥ 1000 MPa		EN ISO 527
Melt mass-flow rate (MFR)	0.2 ≤ MFR ≤ 0.7 [g/10 min] The MFR value may deviate by a maximum of ± 20% from the specified MFR value	Nominal load: 5 [kg] Test temperature: 190°C	EN ISO 1133
Stress Crack Resistance ESCR <i>Alternatively: FCNT</i>	> 10.000 hrs <i>500 hrs</i>	ASTM D1693 ESCR, F50 <i>80°C, 4 MPa, 2% Arcopal</i>	ASTM D1693 <i>ISO 16674</i>
Volatile constituents	≤ 350 [mg/kg]		EN 12099
Moisture content	≤ 300 [mg/kg]		EN ISO 15512
Carbon black content (applies only to black materials)	2 to 2.5 [%] (by weight)		ISO 6964
Carbon black dispersion	≤ Grade 3	Test specimen freely selectable	ISO 18553
Pigment dispersion <sup>f)</sup>	≤ Grade 3	Test specimen freely selectable	ISO 18553
<b>2.</b>	<b>Tender specification - product items</b>		
	Product description	Unit price	Total price
2.1	Krah Pipes DN/ID ....  made of PE100,		

# Tender text for sewage pipes made out of Polyethylene

	<p>General requirements acc. to EN 13476, DIN 16961 and DIN 16917, with structured or solid wall, raw material approved for gravity and pressure application, with a co-extruded and inspection-friendly inner surface. Minimum wall thickness acc. to DIN 16961, ring-stiffness according to static requirements, with integrated Electrofusion socket and spigot.</p> <p>As required in installation lengths up to 6,0 m transported to construction site, properly uploaded, stored, lowered into the trench at a sufficient height and correctly aligned on foundation, have to be according to the installation regulations described in DIN EN 1610 and installation manual of the pipe supplier.</p> <p>Welding joints have to be according to the manual of the pipe supplier:</p> <ul style="list-style-type: none"> <li>• Electrofusion socket with integrated brass heating wire in meander shape, diameter <math>\pm 2 \text{ mm} \pm 3/100</math>)</li> <li>• Structural static proof acc. DWA A 127 safety factor:  max: cover in m.....  min: cover in m.....  traffic load: truck....  max. ground water level above pipe crown (longtime), in m....  max. ground water level above pipe crown (short time), in m...  bedding: base group/Dpr.....%  ground soil: base group/Dpr...%</li> <li>• The proofed static calculation has been submitted before the start of installation</li> </ul> <p style="text-align: right;">....meter</p>		
2.2	<p><b>Krah pipe- fitting piece DN/ID....</b></p> <p>made of PE100, as described at item 1, as gap closure, with coextruded and inspection friendly inner surface, additional extrusion welding, manually cutting for fitting into trench  pipe lengths ..... m,  incl. cover socket made from PE100 for extrusion welding</p> <p style="text-align: right;">.....pcs</p>		

## Tender text for sewage pipes made out of Polyethylene

2.3	<p><b>Krah Pipe - standard manhole DN/ID.....</b></p> <p>made of PE100, acc. to EN 13598, manhole shaft acc. to EN 13476, DIN 16961 and 16917, wall structure acc. to DIN 16917 type A1 or A2, with security steps made of PE, with welded channel, berm and bottom.</p> <p>All weldings are according to DVS 2205, static calculation of manhole acc. DWA A 127 by using adequate software. The full design has to consider all requirements for raw material, pipe design, statics and for welding.</p> <p>The joint between upper shaft and concrete slab/lid has to provide adequate sealing solution, preferred is a telescopic design to avoid direct axial load induction into the manhole shaft. The chosen design has to be considered in the structural calculation.</p> <p>Construction height from pipe sole up to top edge .....m,          Manhole shaft DN/ID.....          Manhole height.....m over pipe crown          Inlet DN/ID.....          Inlet angle.....          Outlet DN/ID.....          Outlet angle.....          Channel inner diameter.....mm          Side flow DN/ID.....          See also item 1</p>		
2.4	<p><b>Krah Pipe - tangential manhole DN/ID.....</b></p> <p>made of PE 100, acc. to EN 13598, manhole shaft according to EN13476, DIN 16961 and 16917, wall structure acc. to DIN 16917, type A1 or A2, with security steps made of PE, with welded channel, berm and bottom.</p> <p>Shaft laterally jointed with main pipe.</p> <p>All weldings acc. to DVS 2205, Static calculation</p>		

# Tender text for sewage pipes made out of Polyethylene

	<p>of manhole shaft acc. DWA A 127 by using adequate software. The full design has to consider all requirements for raw-material, pipe design, statics and for welding.</p> <p>The joint between upper shaft and concrete stab/lid has to provide adequate sealing solution, preferred is a telescopic design to avoid direct axial load induction into the manhole shaft. The chosen design has to be considered in structural calculation.</p> <p>Tangential manholes are recommended for main pipes &gt; DN 1000 Construction height from pipe sole up to top edge....m, Manhole shaft DN..... Manhole height.....m over pipe crown Inlet DN/ID ..... Inlet angle..... Outlet DN/ID Outlet angle..... Channel inner diameter....mm, Side flow DN/ID..... See also item 1</p> <p style="text-align: right;">.....pcs</p>		
2.5	<p><b>Segmented bend DN/ID.....</b></p> <p>made of PE100, fabricated of pipes, described as item 1, fulfilling all static requirements, all segment-weldings made by extrusion welding or butt-fusion acc. to DVS 2207.</p> <p>Bend-ends with integrated Electro-socket and spigot.</p> <p>preferred radius= 1,5 x DN -----angle</p> <p style="text-align: right;">...pcs</p>		
2.6	<p><b>Segmented T-branch DN/ID.....</b></p> <p>made of PE100, fabricated of pipes, described as Item 1, fulfilling all static requirements, all segment weldings made by Extrusion welding or butt-fusion acc. to DVS 2207. T-ends with integrated Electro-socket and spigot.</p>		

## Tender text for sewage pipes made out of Polyethylene

2.7	<p><b>Reducer inverted level, DN/ID.....</b></p> <p>made of PE100, fabricated of pipes, described as item 1, fulfilling all static requirements, all segmented weldings made by extrusion welding or butt-fusion acc. to DVS2207.</p> <p>Ends with integrated Electro socket and spigot.</p> <p>Main diameter DN..... reduced diameter DN.....</p> <p style="text-align: right;"><b>....pcs</b></p>		
2.8	<p><b>HAS House connection fitting , OD..... made of PE100</b></p> <p>for house connection, made of PE100, for branch dimensions OD125, 160, 200 and 225 mm for main pipes DN/ID &gt; 300mm Installation by using HAS Welding devices only Installation on manual from the pipe supplier has to be respected</p> <p style="text-align: right;"><b>....pcs</b></p>		



## End credits

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### Calendar 2017

We are heading towards the end of the year 2016 and many people are asking if we will have a new Krah-Pipe Calendar for 2017 – Yes, we have! At the moment the photo-shootings are going on in several countries. First pictures are already pre-published on our instagram account „@derkrah“, in October/November we will do the final choice of the pictures – we will also consider the number of LIKES. So be a part of the choice, and like your favourite picture.



If you request one free copy please send an email to: [calendar@krah.net](mailto:calendar@krah.net)

### K-Show 2016

Our booth will –yet again- have a Bar (as requested by everyone) and good German cuisine, all sales employees and technical employees – to answer your individual questions, to explain innovations and new developments and of course for a social get-together and to maintain business relations. You will find us at hall 16, booth D77.

