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Large Diameter Polyethylene Pipe Solution for Infrastructure



DN/ID 3000mm Krah Pipes for outfall application in Saudi Arabia



Krah manholes of DN/ID 1500mm by 11m height

Leak proof, safe and huge
designed to perform according to YOUR requirements.

10 Reasons to Choose **KRAH** HDPE Pipes Over Traditional Materials for Your Infrastructure Projects

Most sewage and wastewater systems in the Middle East and Asia are still designed using rigid pipe materials such as concrete, clay, and asbestos cement. However, with the introduction of thermoplastics like HDPE—a versatile material—many benefits are offered, which should be considered for sustainable infrastructure.



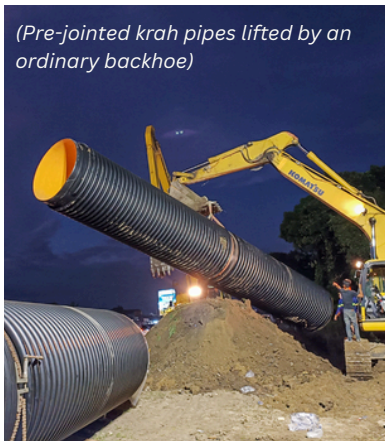
(Various krah pipe wall profiles)

1. DESIGN FREEDOM

Pipes produced using KRAH technology can be designed with an optimum stiffness-to-weight ratio in sizes ranging from 300 mm to 4000 mm, using either solid wall, structural wall or combined designs. These pipes can also be used to fabricate manholes or tanks based on specific requirements, allowing the entire pipe system to be made from HDPE homogeneously. Optimized designs are achievable.

2. LIGHT WEIGHT

The specific weight of the material is lighter than that of conventional materials, resulting in reduced transportation and handling costs. Additionally, pipes can be welded above the trench in long lengths and then lowered into place without the need for special bedding requirements.



(Pre-jointed krah pipes lifted by an ordinary backhoe)

3. DURABLE YET FLEXIBLE

Flexible pipes absorb external loads by deforming slightly, transferring stress to the surrounding fill material with minimal to no impact on flow capacity. Unlike rigid pipes, which retain stress and risk cracking, flexible pipes offer safety and eliminate the need for special fittings for gentle curves. Flexibility is safety!



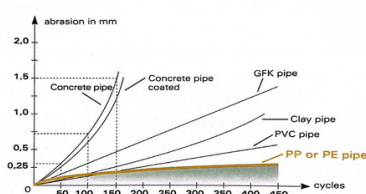
(On-going electrofusion jointing)

4. LEAK PROOF

Jointing is done by electrofusion, extrusion, or butt fusion welding, ensuring a tight and homogeneous system. This eliminates exfiltration, infiltration, and root intrusion, significantly reducing the need for maintenance or replacement.

5. HYDRAULICALLY SMOOTH BORE

The pipes have a very smooth internal surface, this a very low friction factor. Typically the C - coefficient is 150 and this remains same throughout the lifetime compared to concrete which decreases over a period of time.



(Abrasion curve of various pipes)



6. ABRASION RESISTANT

Tests result from the so-called Darmstadt procedure acc. to DIN EN 295 1 have shown that HDPE have much higher resistance to abrasion than concrete, clay or asbestos cement pipes. It is for this reason HDPE pipes are used to carry slurries in mining industries, a property equally important for sewers in Middle East where sand is often carried.



7. CORROSION RESISTANT

Corrosion is a major cause of network failure in the conventional materials. This is more common in the wastewater network where there is formation of sulfuric acid on the pipe wall due to oxidation of H₂S gas in the system. This leads to thinning of pipe wall and eventual collapse of the pipe.

8. LONG LIFESPAN

HDPE pipes are known for their exceptional durability, often lasting between 50 to 100 years when used in typical infrastructure applications. Their resistance to corrosion, abrasion, and chemical attack makes them ideal for long-term use in harsh environments. With minimal maintenance required, HDPE pipes offer a reliable, cost-effective solution for infrastructure projects over many decades.

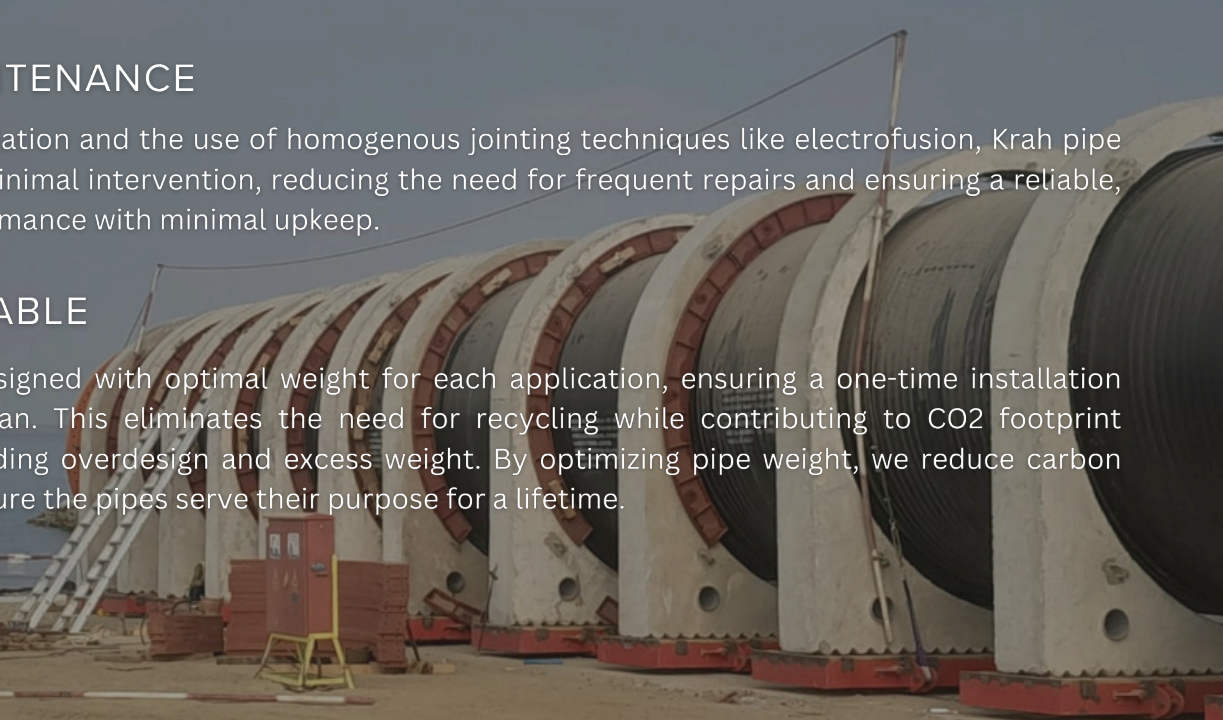
The most common failure in HDPE pipe systems occurs at the joints, where improper connection can lead to leaks or weaknesses. To ensure a long service life for a pipe network, Kraih recommends using a homogenous jointing technique like electrofusion, which creates seamless, strong bonds between pipes. This method is crucial for maintaining the integrity and durability of the entire system over time.

9. LOW MAINTENANCE

With proper installation and the use of homogenous jointing techniques like electrofusion, Kraih pipe systems require minimal intervention, reducing the need for frequent repairs and ensuring a reliable, long-lasting performance with minimal upkeep.

10. SUSTAINABLE

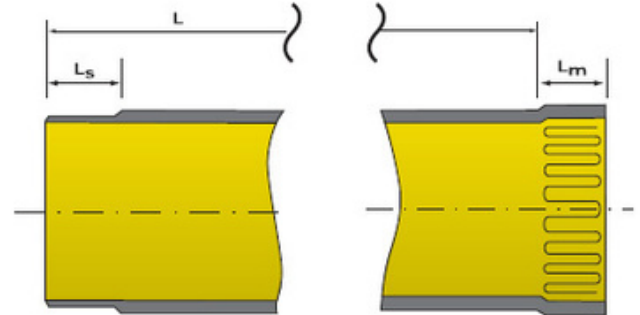
Kraih pipes are designed with optimal weight for each application, ensuring a one-time installation with a long lifespan. This eliminates the need for recycling while contributing to CO₂ footprint reduction by avoiding overdesign and excess weight. By optimizing pipe weight, we reduce carbon emissions and ensure the pipes serve their purpose for a lifetime.



Fittings

The KraH pipe can be provided in the complete range of diameters and stiffness classes but also fittings, manholes and other components are deliverable to accomplish the mission of a homogenous and reliable pipe system.

All fittings are fabricated from solid wall pipes. Generally, the fittings are designed corresponding to the required stiffnesses and in consideration of the welding factors. Every fitting can have any kind of pipe end and can be assembled with the existing pipe system with any jointing technique.



All pipe end dimensions fulfill the requirements of the standard EN 14376, like the minimum lengths and stiffnesses. The standard spigot length (L_s) is 140mm and the standard socket length (L_m) is 140mm.

All fittings are fabricated out of pipes (mainly solid wall pipes) with an equivalent stiffness.

Branches

Branches can be manufactured and delivered in every type and form. The angle can be adapted individually from 15° to 90° as well as the ends and the respective segment lengths.



bend

branch

Bends

Bends can be manufactured and segmented in different angles and the related radius of the bend to pipe diameter can be selected independently.

In the table the standard bend angles are mentioned, according to DIN 16961 - other diameters on request. Basically every angle can be produced

α	Number of segments
15°	2
30°	2
45°	3
60°	3
75°	4
90°	4

Reductions



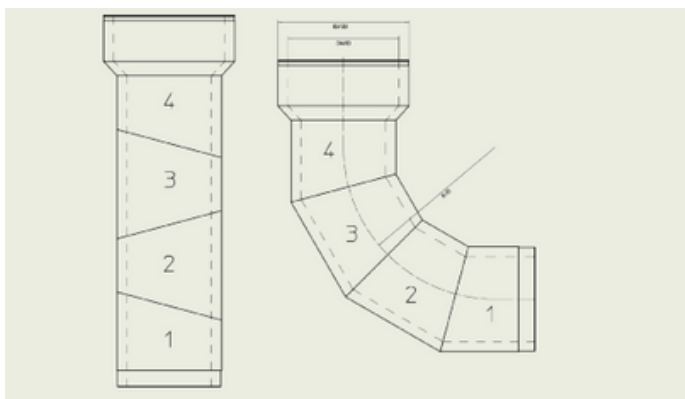
Reductions can be made both centric and eccentric so that they will meet all the requirements. For standard reductions the maximum difference in diameter is 200mm, other differences on request.

House connections



House connections can be installed at any time using our transition sleeves. The house connection can be built onto the profile pipe at any place and in any weather. All usual dimensions for house connection lines are available. The assembly can be carried out by experts on site.

The standard diameters are DN/OD160mm and DN/ OD 200mm, but other dimensions are possible. Following any other kind of pipe system as, for example, corrugated, clay and PVC pipes can be jointed



Division and new arrangement of the pipe segments to create a 90 deg angle



House connection

Puddle flanges

In order to lead Krah pipes through walls, e.g. in sewage plants or concrete shafts, we recommend our puddle flanges which can be flush - mounted in concrete. The tightness is secured by an anchor and a ring made of EPDM.



Manholes

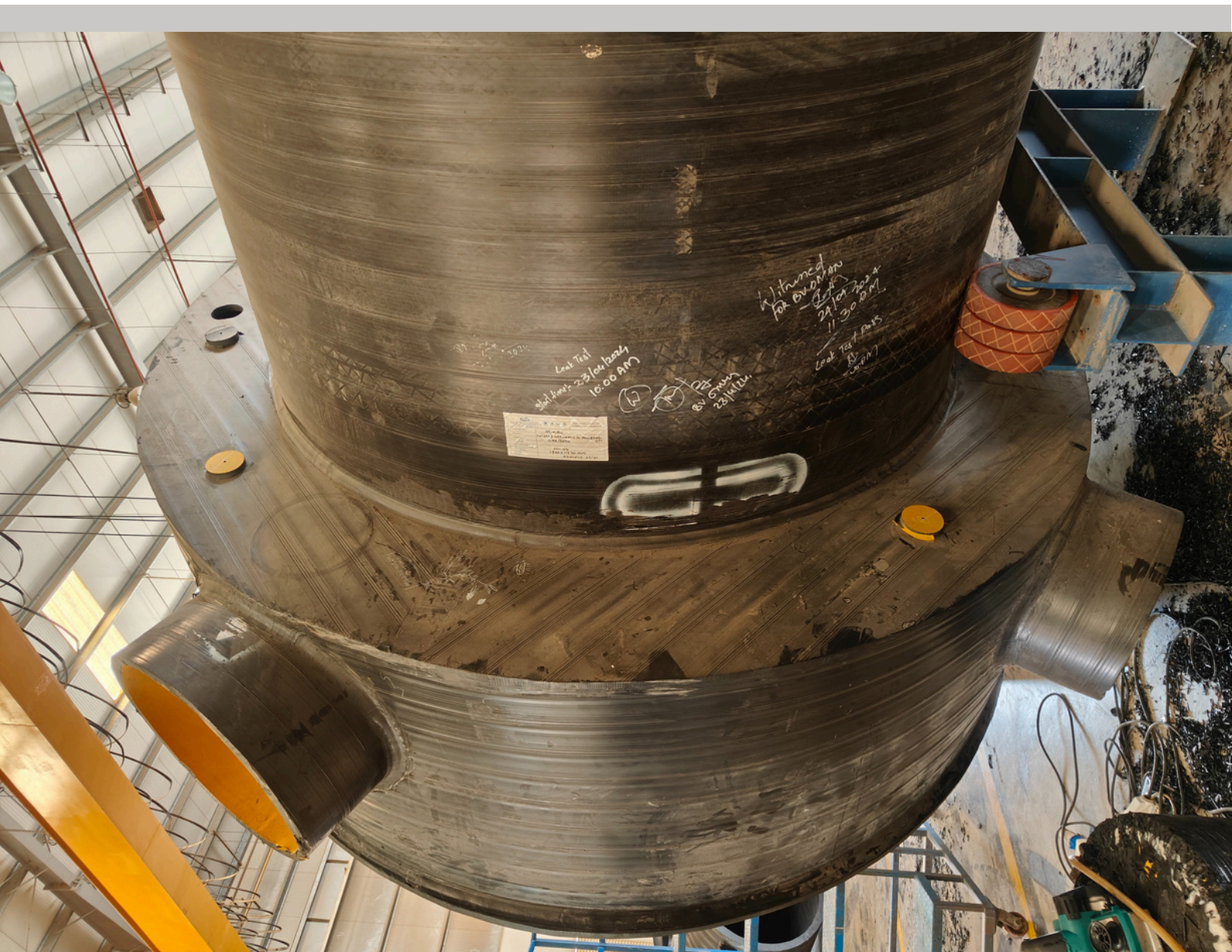


DN/ID 1500mm Krah manhole with 15-ton weight on top

Krah manholes are reliable for their durability, adaptability, and eco-friendly design. Constructed from high-quality thermoplastics such as PE 100 and polypropylene, they are lightweight yet robust, offering excellent resistance to damage and heavy loads. The helical extrusion manufacturing process ensures precision and uniformity, while customization options in diameters and configurations make these manholes versatile for various applications. Their design includes advanced features like anti-floating collars, double-bottom systems for buoyancy control, and reliable welding techniques, ensuring stability even in groundwater conditions.

The structural calculations for these manholes adhere to the German standard ATV A127E, DVS 2207 for the welding and DIN EN 1610 for the installation which ensures optimal performance and long-term reliability in underground applications.

To have the possibility to control and maintain pipe systems regularly, manholes are integrated in the system. These are mainly installed at the positions of bends, reduction or branches. The manholes are connected to the system by electrofusion making the whole system homogeneous. With preference, profile types like CPR and SQ are used for the production of the manholes, as the soil can densify better at the smooth outside of the pipe and can settle without problems.

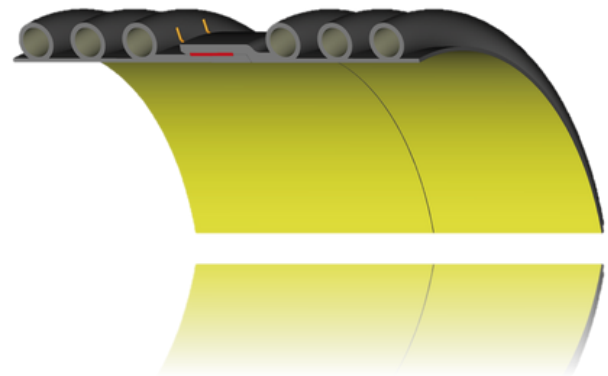


Joining technology

All Krah pipes are produced automatically with a socket and spigot, which are adaptable to the following kinds of joining techniques:

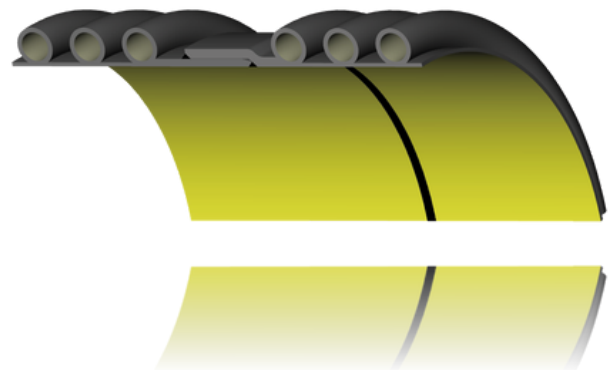
Electro fusion joint

This is the most preferred joint system, as the whole pipe system becomes a homogenous unit. A welding wire which is included in the socket or spigot is heated with the help of a special welding device whereby the two pipe ends (socket and spigot) are jointed together. The electro-fusion jointing technique is a very favourable, simple and secure method to install pipes in even very narrow trenches in a short time. For further information please refer to our special brochure.



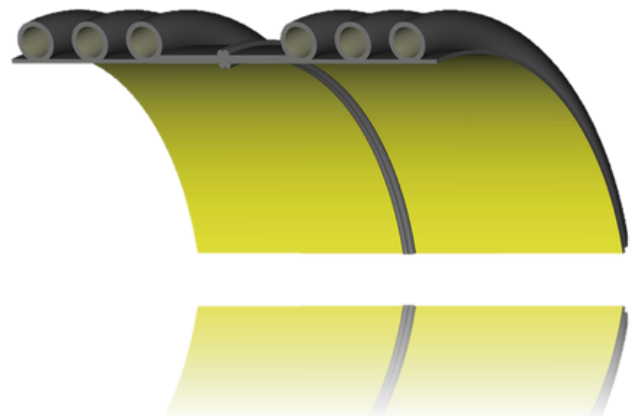
Extrusion welding

The pipes and/or fittings which are to be connected are jointed by a socket and spigot joint. Like so, the two pipe ends are connected with the help of an extrusion welding device. The jointing method can be carried out inside or/and outside of the pipe. This jointing is most suitable for low-pressure gravity pipes and manholes. The welding has to be done according to DVS 2207 part 4.



Heat element butt welding

The pipes and fittings are jointed with the help of a heating element butt welding machine. The ends of the pipes and fittings are butt-welded. This kind of jointing method is only recommended for pipes and fittings with a maximum wall thickness of 150mm and with diameters from DN/ID 300mm to DN/ID 2500mm. The welding has to be done according to DVS 2207 part 1.



Applications

Due to the versatility of Krah pipes, with all its different kinds of profiles, they are applicable in all kind of fields of application:

Sewer and stormwater systems

Sewer systems made of Krah structured wall pipes have been used for more than 45 years in all areas of local and industrial drainage. Krah GmbH offers a modern sewer pipe program with manholes, fittings, and safe jointing systems for the planning of sewer treatment plants.

Outfall pipelines

Water outlets are used for the discharge of liquid and gaseous substances at the base of rivers and the sea. For the construction and operation of such pipelines Krah pipes offer considerable advantages, such as the elasticity of the pipeline and therefore optimum adaptation to the area, low weight, secure and strong jointing technology, seawater resistance and pipe stiffness exactly adapted to the respective requirements because the appropriate profiles are selected for every individual project.

Tanks and containers

Profiled or solid wall pipes made of polyethylene or polypropylene are well suited for the manufacture of horizontal and vertical tanks. For other special constructions like chimneys, compost plants, and wash towers Krah pipes offer all advantages regarding variety, precision, quality, and expandability.

Reservoirs, stormwater tanks

Within a sewage system, especially mixed water systems, reservoirs can store rainwater for delayed release to the sewage plant. This will avoid overload. As reservoir systems are usually built-in subsequently, they must be assembled in a very short time. Since Krah reservoirs are prefabricated, this condition is fulfilled perfectly. Krah pipes offer considerable advantages:

- the compact construction allows short building times
- 100% tight joints between the various elements due to the electro fusion process
- smooth inner surfaces which prevent incrustations
- the pipe's self cleaning ability

Relining

The reconstruction of damaged sewer pipes by means of relining, pipe in pipe method, becomes more and more important. Krah pipes are very suitable for the relining process. Specific pipe stiffnesses can be calculated for all loads. Also in the area of short pipe relining, Krah pipes offer competent solutions. The welding can be carried out inside the shaft. Pipe lengths are available from 1m to 6m.

Krah pipes are able to reestablish the static carrying capacity of the sewer without the need of digging. In order to insert longer stretches, pipe lengths of up to 18m can be pre-fabricated. With pipes DN 800 and larger, it is also possible to insert the pipe one by one into the existing sewer network and weld from the inside of the pipe.

Landfill

Krah is a competent partner for system components for drainage and de-gassing of landfill sites. Many landfill sites have been successfully equipped with profiled drain pipes and manholes. Krah's developments have set new standards for soil and ground water protection. Drain shafts with control systems are available in diameters of up to DN/ID 4000 mm.

STANDARDS

Pipe or Shafts – EN 13476, DIN 16961
Statistical dimensions – ATV A127
Hydraulic dimensioning – ATV A 110
Pipe Installation – DIN EN 1610
Jointing of the pipes – DVS 2207
Vertical shafts for manholes – ASTM F1759 & ATV 127

Special applications

In addition to the common areas of application Krah pipes are also suitable for special projects like tunnels etc. Krah pipes are also used as ventilating pipes. The advantage over the traditional ventilating pipes which are made of sheet steel is, that they are corrosion-resistant which is especially important for the chemical and biological industry.

Industrial applications

Pipeline systems which are installed for industry applications have superior high expectations. Problems in this field are the chemical constituents and the high temperatures of the transported medium. In this case we can produce special applications.



Wastewater treatment plant using
Krah pipes in Egypt



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