The Keyhole-Technology:

Efficient new installations and rehabilitation of house connections from small construction pits

Reference: Dipl. Ing. Elmar Koch

Tracto-Technik GmbH & Co.KG

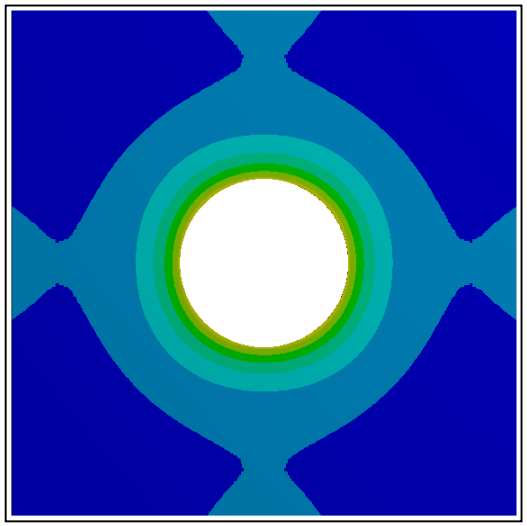
Today´s standard in the medical technology

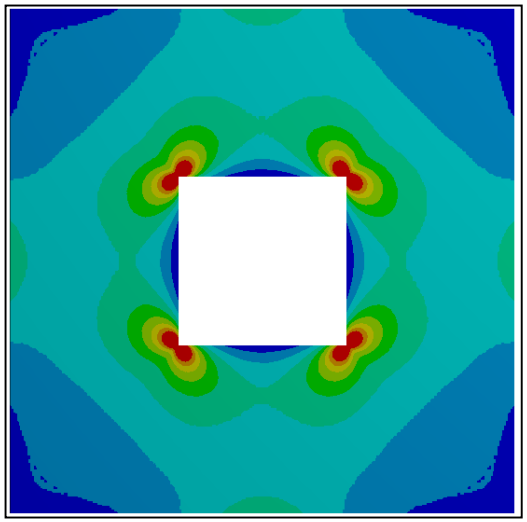
- **Minimal-invasive Chirurgie** (**MIC**) is a main description for operative surgery with the smallest Trauma (with slightest injury of skin and soft tissue).

Quelle: Wikipedia

Tension comparison with FEM

*„Constant execution **without** the usual **surface follow on damages and costs** from the open trenching method.“*

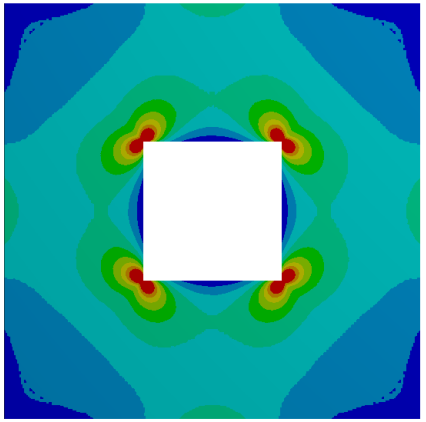




With identical surface strains the square construction form shows 4 times higher tension in the corners (indicated in red) as opposed to the circular excavated form.

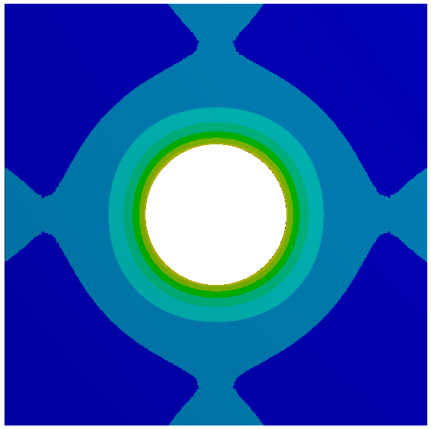
Tension outcomes

Increased tensions in the corner, therefore follow-on damages are inevitable.

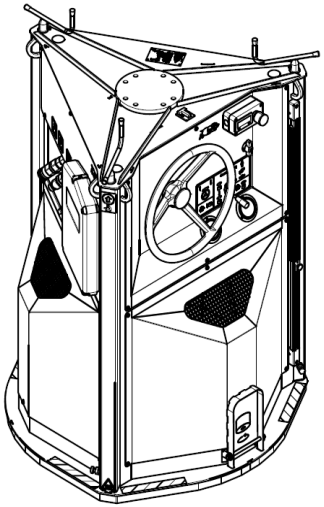


The circle has no corner points!

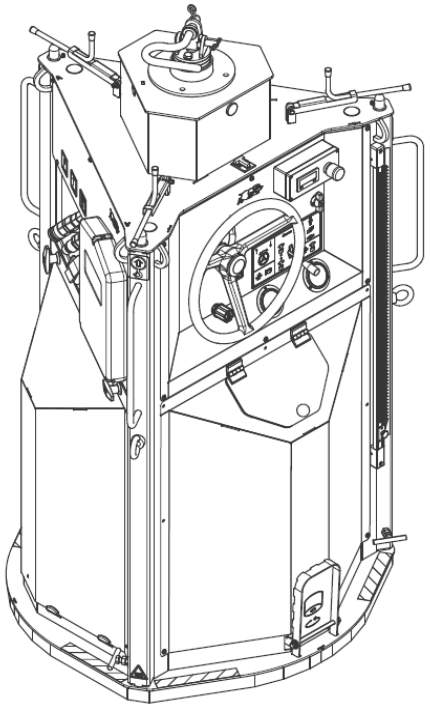
Up to 4 times less tension in the area of the flat joints.



Different versions of Coring units



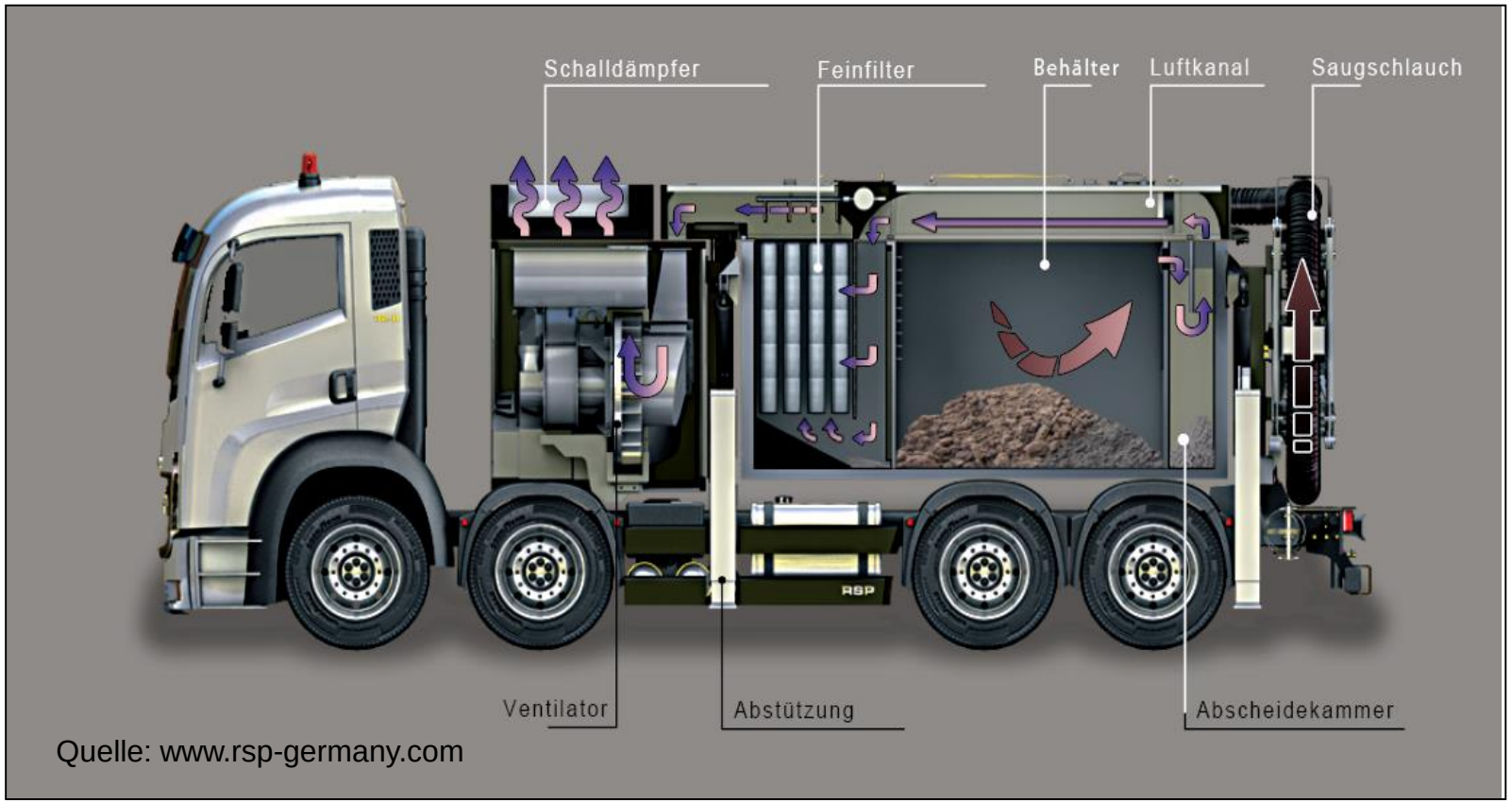
Cutting depth
450 mm



Cutting depth
650 mm

Function principle Suction excavator

*„**Damages** to available service lines **are prevented** when applying a suction excavator.“*



Quelle: www.rsp-germany.com

Suction from the construction pit

With the application of the suction excavator technology damages to open service lines are prevented.

Depending on the ground conditions the application of a support installation makes sense, to prevent the soil from collapsing down.

Coring unit assembled on suction excavator arm

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Specialist vehicle brief
TT-UK/RSP Keyhole Coring Vehicle

Innovative key-hole road surgery technology that reduces repair time, lessens environmental impact and improves health and safety.

Keyhole coring technology is an innovative excavation technique that provides quick, safe and cost-effective excavation for the repair and maintenance of underground pipes and cables. This technology removes the need for more expensive and time-consuming conventional excavation methods to be employed.

12 tonne Keyhole Coring Vehicle deployed by National Grid

Meeting the needs of today's modern fleet

www.hccvs.co.uk

TT-UK/RSP Keyhole Coring Vehicle
Reduces repair time, lessens environmental impact and improves health and safety

The Keyhole Coring Unit produces a keyhole access pit measuring from 18 to 24 inches in diameter in road surfaces and footpaths which are made of asphalt or concrete. Using a special clamping device the core is removed from the surface in one circular piece and suction excavation technology is used to remove the remaining spoil to expose the pipes and cables. A quick coupling system allows for a fast change-over between the coring unit and the suction hose, with the excavated spoil being stored in an on-board tank.

Using specially designed long handled tools, engineers are able to reach down to the damaged section through the keyhole to make the repairs to the underground pipes or cables. Engineers no longer need to physically get down into a trench, which makes this technique much safer. When the repairs are completed, the stored excavated spoil is used to refill the hole and a Soil Compaction Supervisor (SCS) pad is placed at the base of the excavation pit. This provides accurate readings to a hand held device on the surface; which manages and documents performance of the compaction activity, ensuring construction regulation standards for compaction are met. The original cored road surface is then replaced perfectly back into the keyhole bore and sealed using a special cement grouting sealant.

This process is much faster, efficient and safer than conventional methods of excavation and reinstatement as it minimises surface disruption and preserves road/footpath surfaces. The circular shape of the keyhole causes considerably less joint edge tension compared to square-cut jobsite excavations, as it can help to prevent stress cracks occurring, which can be caused by rain and frost damage to the grouted joints.

Advantages of keyhole coring technology:

- Low investment and operating costs
- Minimal set up times and simple to transport to sites
- Much faster, efficient and safer than conventional methods of excavation and reinstatement
- One person operation
- Improved health and safety as engineers no longer need to physically enter a trench
- Circular boreholes do not develop stress cracking as they have no corners
- Less material is removed from the excavation
- The original round core which is removed from the road/pavement surface is reused in the final re-instatement process
- It is easier to compact a small diameter excavation than a large trench
- The bonding agent used to replace the original cored pavement material is more durable than traditional imported asphalt methods

For further information on the Keyhole Coring Vehicle, as well as details on available funding options, please contact Hitachi Capital Commercial Vehicle Solutions on 01225 777710.

Visit the website www.hccvs.co.uk

TT-UK & TT-Ireland are the exclusive Sales Partners of the RSP coring unit.
www.tt-uk.com / www.rsp-uk.co.uk

Hitachi Capital Commercial Vehicle Solutions
Quarry House, Canal Road, Trowbridge, Wiltshire BA14 8QU
T. 01225 777710 www.hccvs.co.uk

RSP City Sucker with TT Coring Unit

Basic data

Chassis	Mercedes Benz Atego
Wheelbase	4,160 mm
Diesel engine	238 PS
Overall measurement	8,000 x 2,400 x 3,070 mm
Unladen vehicle weight	11,300 kg
Gross vehicle weight	12,000 kg

Suction system specification

Actuation	Hydraulic
max. volume	11,300 m³/h
max. vacuum	14,855 Pa
Behälter	cyclone 1.1 m³
Container discharge	side tipper into big bag
Compressed air system	4.5 m³/min, 7 bar
Filter system	24 cartridge filters,
Control system	PLC and radio remote control

http://www.rsp-germany.com/files/1443FF3574F/atego.pdf

National Grid: London jobsite

Core and Vac Truck in operation

Core and Vac Truck in operation

Core and Vac Truck in operation

Core and Vac Truck in operation

Core and Vac Truck in operation

Cleaning tools for St, GG, GGG

The freed pipe, especially steel or cast iron, can often consist of tough adherences, which need to be removed with suitable tools.

Cleaning tools for St, GG, GGG

The operation is carried out from the surface.

There is no need to enter the construciton put, therefore the work safetiness is increased.

Removing the old fitting

Old fittings can be removed from the old pipes with a hydraulic bolt cutter.

After cleaning a new fitting can be attached.

Assembly of the new fitting

With a relevant handling device the fitting is placed in position from the surface.

Assembly of the fittings

Setting the mechanical bore fitting with the assembly tool.

Connection of the service line via a male coupling.

Quelle: EWE Armaturentechnik

Boring to the main service line

Peeling range: 180° on 300 mm

Electro-welding - Fittings

Welding on the connection fittings with suitable manipulators.

Ready service connection

Filling in and sealing off

The construction pit is re-filled in layers and sealed off. Depending on the soil conditions, the excavated material can be re-used.

Sealing is carried out with an air stamper.

Filling in with fluid soils

The application of pre-mixed and self compacted fluid soils is especially recommended when simultaneously filling in several construction pits.

The material is available in sacks and can be mixed on site in small quantities.

Re-instating the bore core

After refilling and compacting the backfill, a 3 cm thick layer of washed gravel (size 4 – 8 mm) has to carry in.

Re-instating the bore core

After this the core will be insert and leveld, maybe a littel bit gravel must be added or removed.

Then the core has to be removed and the mortar can be mixed

Re-instating the bore core

Pour in the ready mixed morta into the gravel bed. The very flowable morta will pour in each hollow space under the road and will ensure by this a porper force application from the surface into the foundation of the road.

Re-instating the bore core

The morta should be filled up to the lower edge of the road surface.

Then insertation of the core and filling the cap with morta until the level is 2 – 3 cm lower then the surface.

Re-instating the bore core

Pour in a 2K elastic sealing agent into the saw kerf until it is filled up completely. Sprinkle some gravel on it to avoid sticking.

Re-instating the bore core

„ The working surfaces, which are only minimally accessed are usually **cleared approx 0,5 – 2 h** after re-installing and sealing off the previously excavated bore core.“

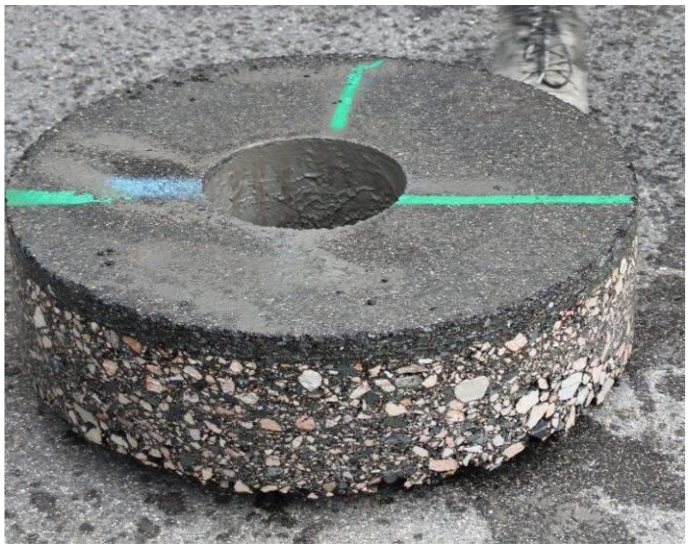
House connection technologies

Due to the immense cost saving potential the Keyhole technology is very interesting in connection with the trenchless technologies for new installations and rehabilitatoin in the field of service house connections.

The technologies available are:

- Rehabiliation of road valve cover
- New installations with soil displacement hammer **GRUNDOMAT**
- New installations with a bore rig **GRUNDOPIT K**

Renovation of service valve cover



Sucking down to the service valve

Re-instating the „millstone“

New installation with GRUNDOMAT

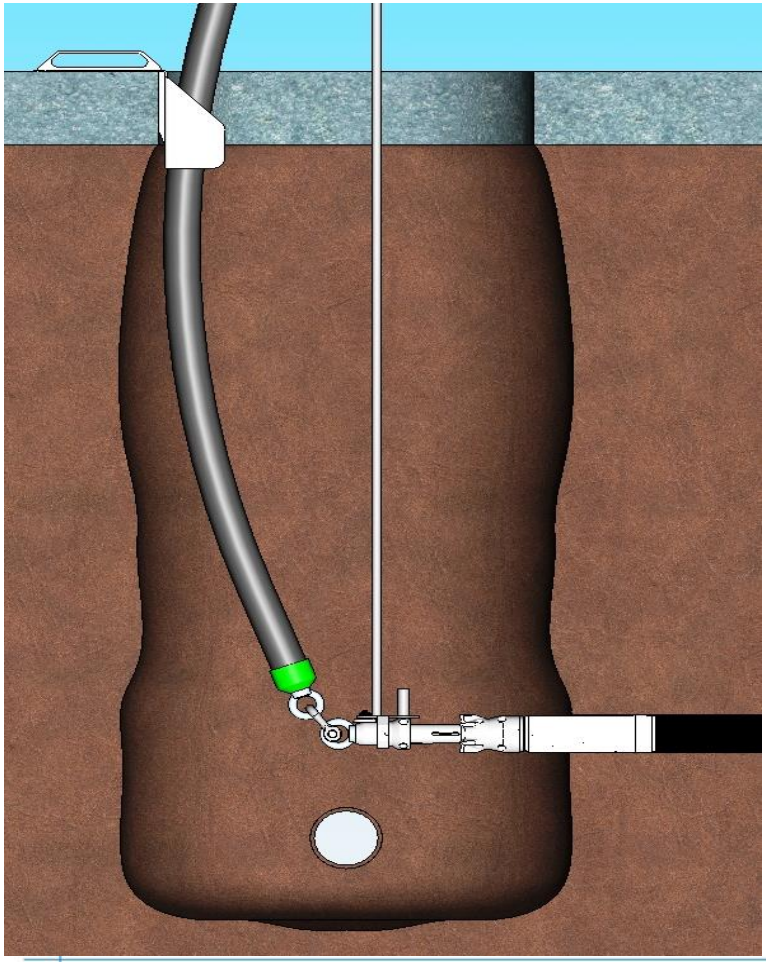
Core drilling Ø 100mm

Aligning the GRUNDOMAT

Installation of host pipe

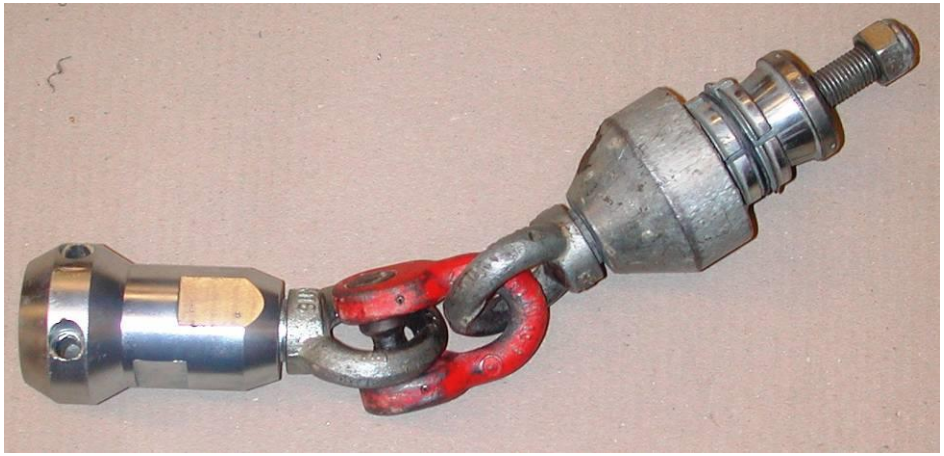
Quelle: Botec

Pipe connection inside the Keyhole

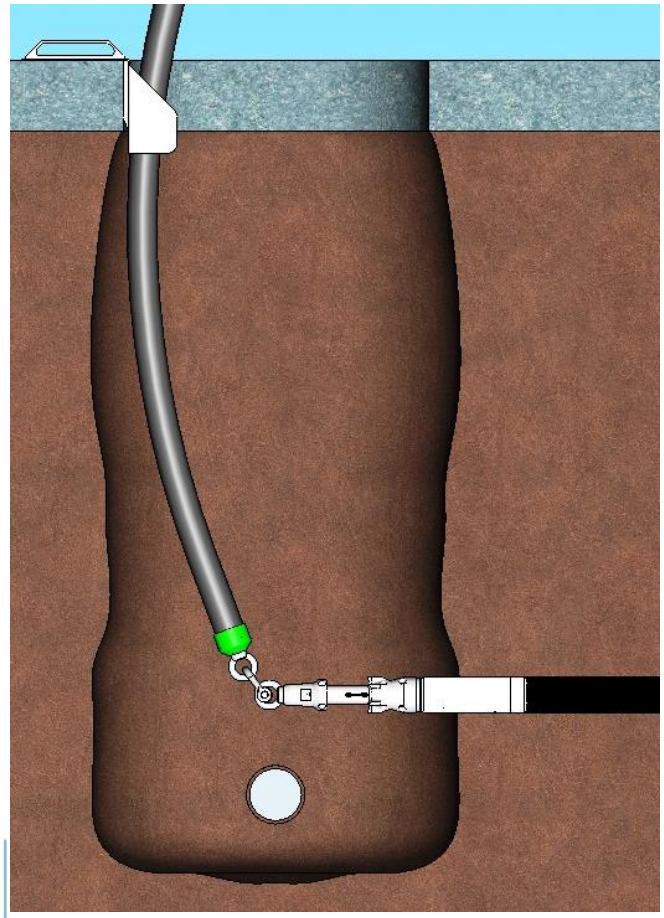


Components:

- Pulling eye
- Shackle
- Pipe puller

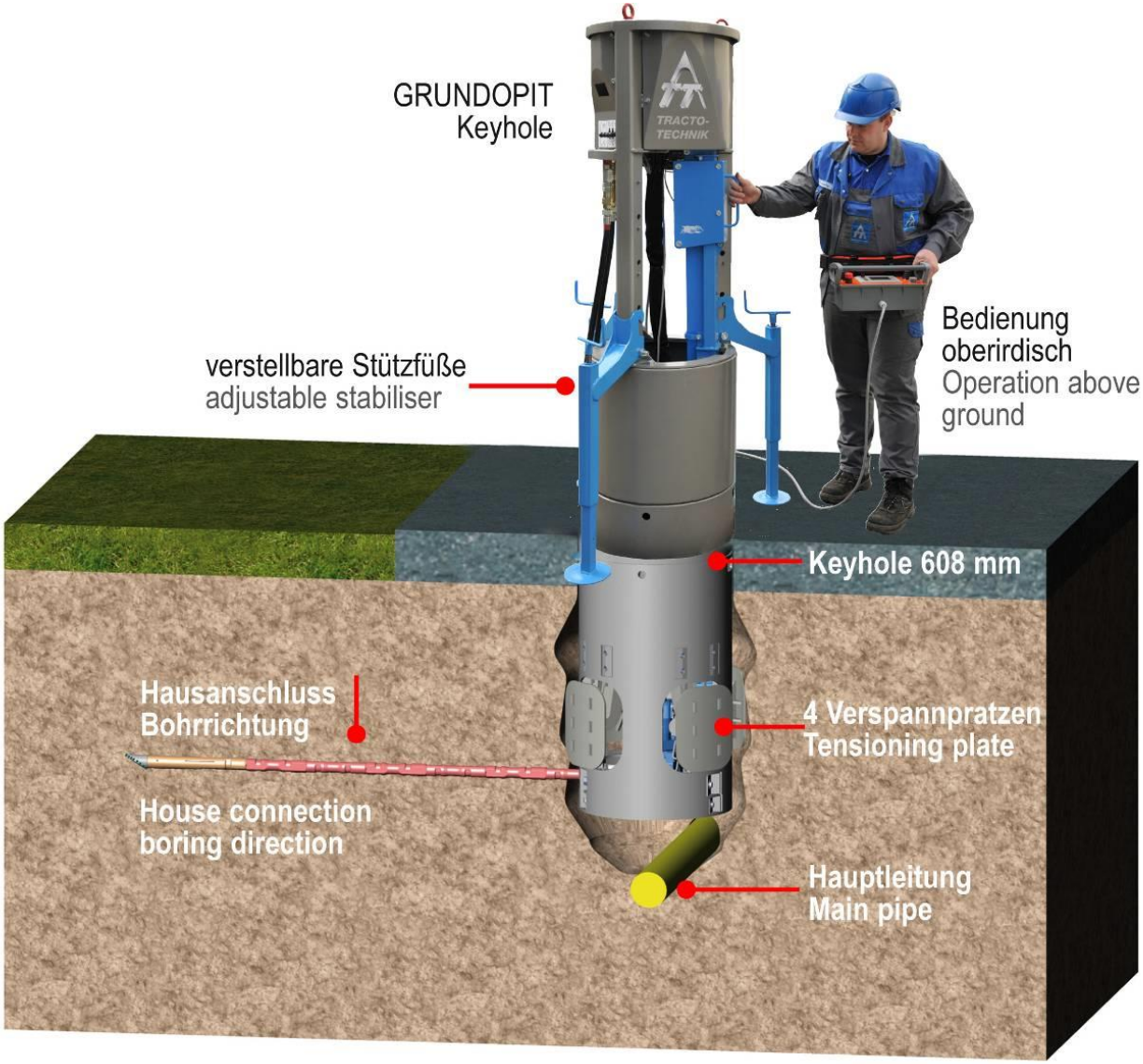


Pull back



Removing of the host pipe

Drill rig – GRUNDOPIT K



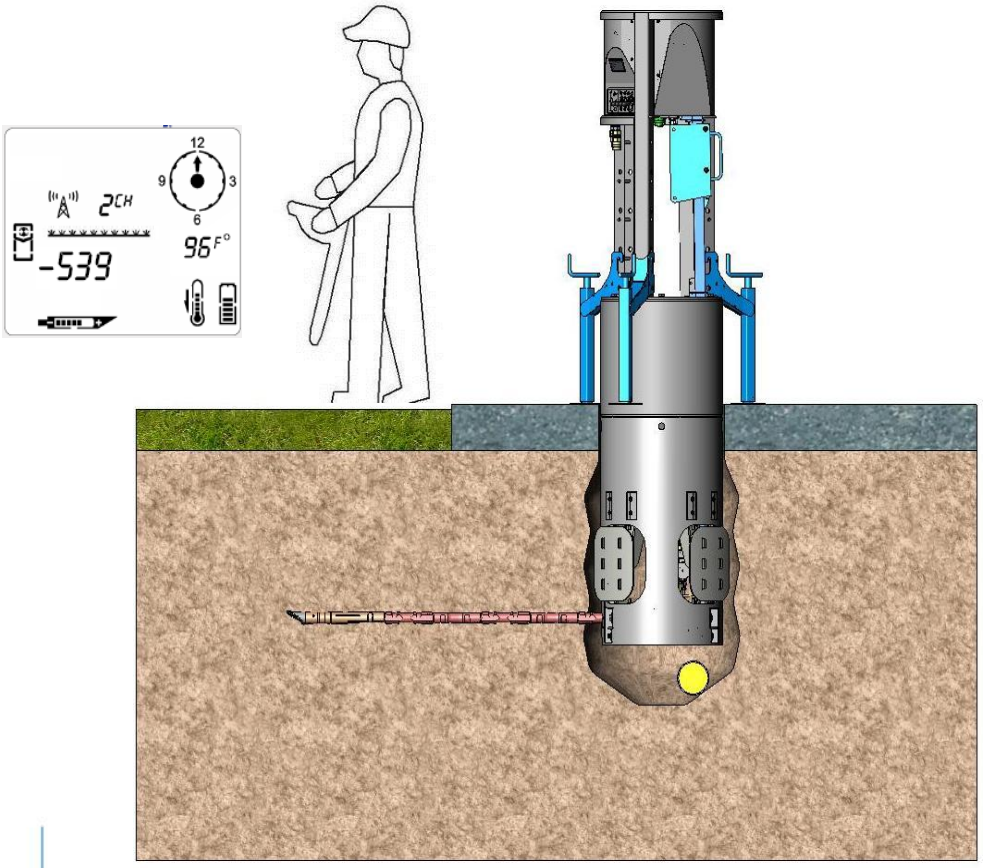
Producing a house connection with Grundopit K

Depending on the type of soil, the bore process can be carried out either with the dry method or the drilling fluid bore method.

Drill rig – GRUNDOPIT K

„ Any possible soil and surface work can be carried out **safer,** in **a reduced circumferance and more productive.** It is not necessary to access the jobsite construction pits.“

Detectable and steerable



The bore head can be checked with a Standard Walk-Over method. Detection depths up to 4 m are possible.

Steerable pilot bore

View inside the basement

Bore through a cellar wall from the outside inwards

Production of the core bore

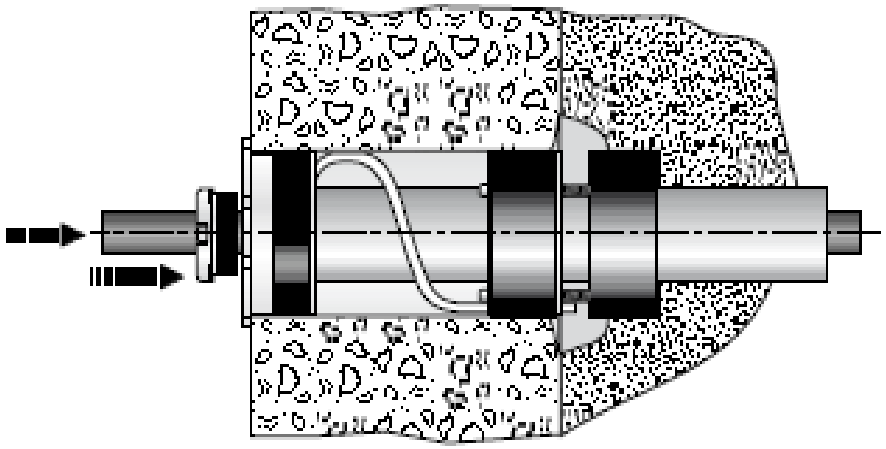
Rotation via pilot drill rod

Reverse pull of the protection pipe back towards the machine.

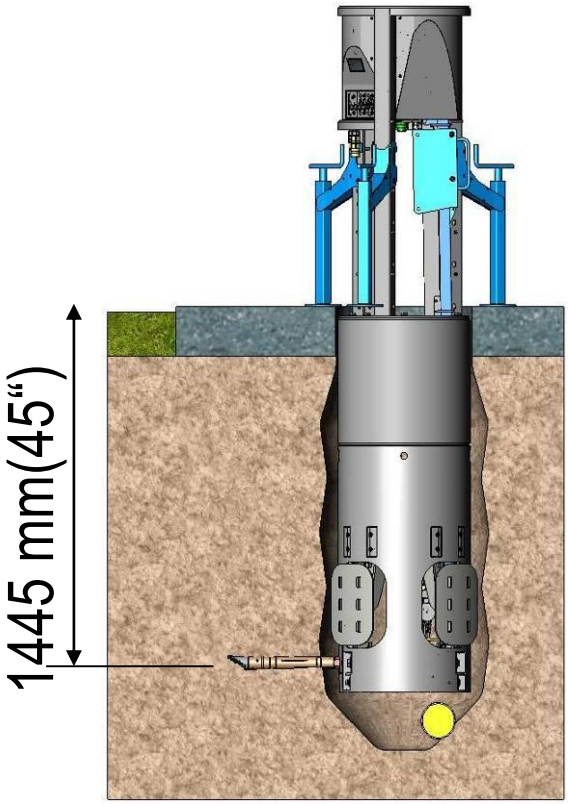
Wall entrance

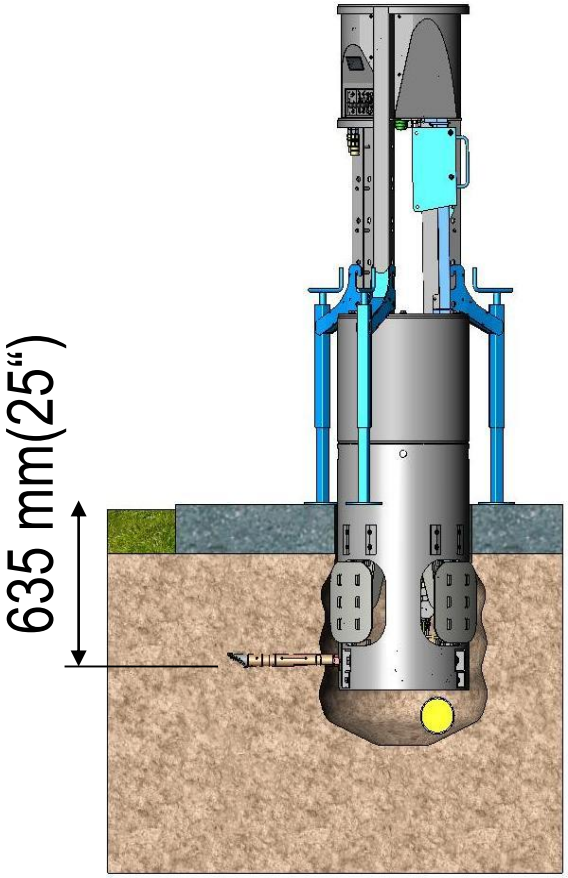
All the mentioned systems work with a wall entrance, assembled on the inne side of the building. It is therefore not necessary to dig underneath the building.

For the complete installation or sanitation you therefore only need a small pit above the main service line.



Machine Operating Range





The depth can be reduced by putting some wood bars under the supports.

Jobsite NG New York

Keyhole LKW Iveco Daily 7 ton

Handling with on board crane

Handling with on board crane

www.keyhole.info

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Keyhole-Technology

Grabenlose Neuverlegung und Erneuerung von Gas-, Wasser-, Strom- oder Datenleitungen für Hausanschlüsse aus einem kleinen kreisrunden Keyhole. Bei der Keyhole-Technik kommt es zu weniger Oberflächenfolgeschäden und -folgekosten, die von der offenen Bauweise her bekannt sind. Die Erd- und Oberflächenarbeiten lassen sich sicherer, in reduziertem Umfang und produktiver ausführen. Ein Begehen der Baugruben ist nicht erforderlich.

Ihre Systempartner

DVGW
FRIATEC
EWE ARMATUREN ...bewährt bis ins Detail!
hauff technik
Gaz de France SUEZ
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Aktuelle Nachrichten

Grabenlose Gashausanschlusstechnik für den Gebäudebestand
08.05.2013 - Stadtwerke, überregionale Versorgungsunternehmen und Netzbetreiber stehen im Rahmen der Energiewende in Deutschland vor großen Veränderungen. Strukturen und Aufgaben werden zzt. verstärkt hinterfragt und sind kurzfristi...

Keyhole-Technology Diashow
12.04.2013 - Grabenlose Neuverlegung und Erneuerung von Gas-, Wasser-, Strom- oder Datenleitungen für Hausanschlüsse aus einem kleinen kreisrunden Keyhole. Bei der Keyhole-Technik kommt es zu weniger Oberflächenfolgeschäden und -folg...

This method is no longer necessary !!!

Tracto-Technik GmbH & Co. KG

Dipl. Ing. Elmar Koch

Reiherstraße 2

57368 Lennestadt / Germany

+49 (0)2723/808-142

elmar.koch@tracto-technik.de

www.tracto-technik.de