

Atlas Copco Ground Engineering Products

# Overburden drilling systems



## Symmetrix and Odex – leading casing drilling solutions

Today, drilled casings are one of most popular methods for foundations, reinforcement work and well drilling. They especially lend themselves to urban work such as bridge, utility line, wharf and building construction. In fact, with the development of DTH drilling and the introduction of special drilling systems like Symmetrix and Odex, casing advancing in overburden has become more refined.





### Two systems to cover your needs

Atlas Copco offers two ranges of overburden drilling equipment. Odex - a retrievable drilling system for smaller holes. And Symmetrix, an all-round overburden drilling system for holes of any depth or size. Together they represent the latest technology in overburden drilling.

### Any rock and any length

Odex is the specialist in normal overburden conditions and shorter holes. Where there's medium to hard ground or a need for larger diameter casings then Symmetrix is right choice. In fact there is almost no limit to the depth Symmetrix can drill - just keep adding on casings.

### Odex – for smaller casings

Odex is an eccentric retrievable drilling system that's ideal for short holes up to 273 mm (10 3/4") in diameter. Well drillers often have an Odex drill bit at hand for simultaneous casing of water and geothermal wells. The advantage is that Odex drills and installs the casing quickly and efficiently. While the ingenious bit system allows the complete drill bit to be retrieved – ready to drill the next hole.

### Symmetrix – the all-rounder

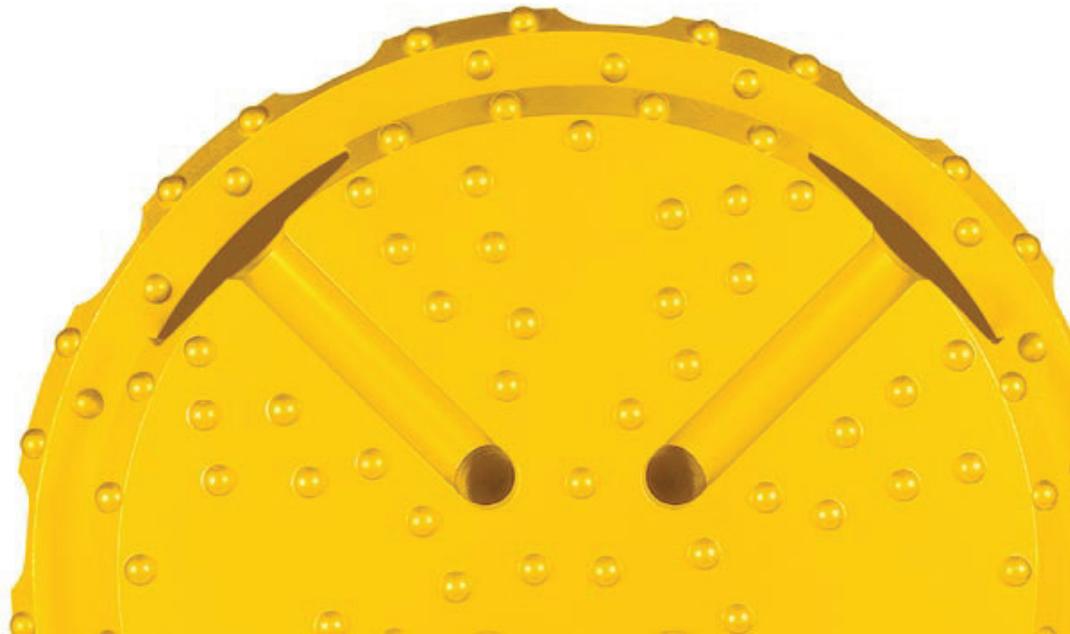
Symmetrix is a concentric drilling system with retrievable pilot bits. They can be used for holes from 76 mm (3") up to 1 220 mm (48"). This system drills in any direction and in any type of ground condition. It is, in fact, the most flexible and efficient overburden system on the market today.

### DTH or topammer rigs

These two systems are so flexible that they can be used on DTH rigs or topammer rigs. Even pile boring rigs, exploration rigs or cranes can be adapted for use.

### A multitude of applications

From anchoring to slope stabilization, from micropiling to curtain grouting, from tunnel forepoling to marine piling applications. Wherever the ground is unstable, drilled casings offer the basis of an excellent solution.





## Odex – the retrievable small holes specialist

Wherever there's a well to be drilled there's always a need to case the overburden layer. This is where this tried and tested eccentric casing drilling system has proven itself to be the ideal solution. In fact, Odex has become synonymous with water well casing drilling.



### **Pioneers in casing drilling**

Odex has become the standard for casing in water wells, geothermal wells and for shallow micropiling work. In fact, in some countries this is referred to as Odex drilling. Atlas Copco has continuously developed the product and today it still outperforms other eccentric systems.

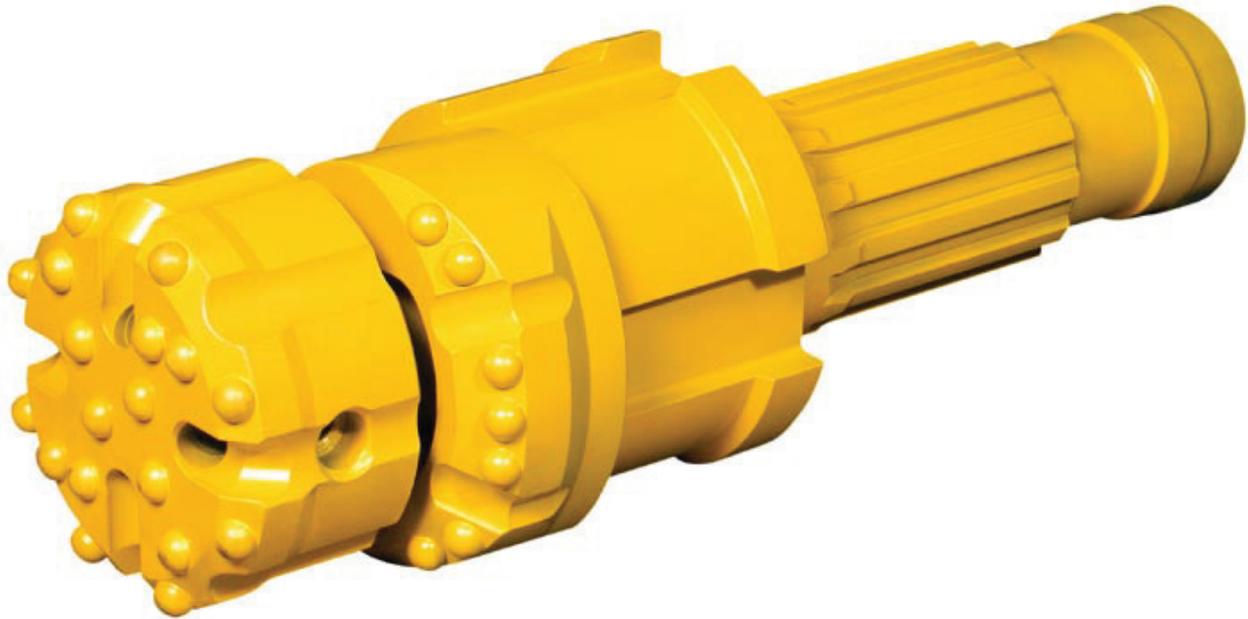
### **Drill through overburden and bedrock**

Odex is ideal for short holes in consolidated overburden. This means it's perfect for most water and geothermal

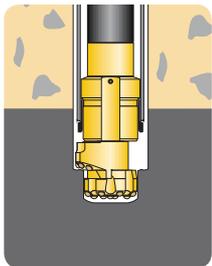
well drilling. Even contractors working with short micropiles find Odex the best solution.

### **Ingenious eccentric system**

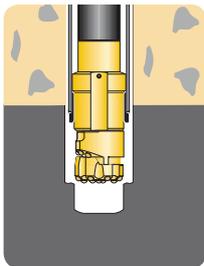
Odex is an ingeniously designed eccentric drilling system which consists of a pilot bit and reamer "wing". The pilot bit protrudes beneath the casing pipe and, as the drill rotates, a specially designed "wing" folds out and acts as a reamer. This creates the space for the casing pipe to advance. Once through the overburden, Odex makes a socket in the bedrock allowing the



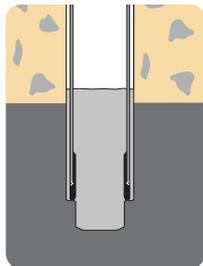
### Odex casing a water well



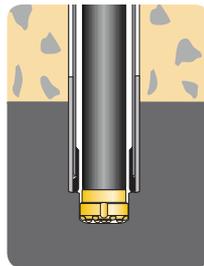
Reamer wing swings out and the casing advances



Reamer wing retracts



The pilot bit is removed and a sealing mixture is poured in



A DTH bit drills through the seal and starts drilling the well

casing to be fixed in place. Then, by simply reversing the drilling rotation, the wing retracts into the pilot bit and the whole drillstring can be removed from the hole leaving the casing pipe in place.

### Retrievable and reusable

For well drillers, it's imperative to have a casing drilling system that's easy to drill with any DTH drill rig. That's where Odex comes into its own.

Thanks to the ingenious reaming wing the bit is retrievable and can be used at the next well.

### Push or pull casing pipes

Odex can be equipped with casing shoe shoulder or without one. By using a casing shoe shoulder, the casing pipe is pulled into hole. When there is no casing shoes shoulder present, the casing pipe is pushed into the hole.

### Available for tophammer or DTH drill rigs

Currently Odex is available in eight diameters from 3" to 8" DTH hammers. They have also become very popular with tophammer drillers and are available in three different sizes from 38 mm to 51 mm threads.

### Available for DTH and tophammer rigs

#### Odex for DTH rigs

Odex 90	for 3" hammers
Odex 115	for 3" and 4" hammers
Odex 140	for 4" and 5" hammers
Odex 165	for 5" and 6" hammers
Odex 190	for 6" and 8" hammers
Odex 240	for 8" hammers

#### Odex for tophammer rigs

Odex 76	for R38 and T38 threads
Odex 90	for R38 and T38 threads
Odex 115	for T45 and T51 threads



## Symmetrix – a revolution in casing advancement

Symmetrix is a truly revolutionary product. Not only is it an all-round multipurpose concentric drilling system. It has also opened the way for engineering consultants to utilize new construction methods that save contractors time and money. Not to mention offer new business opportunities.

### **Can drill through almost any ground condition**

Atlas Copco's philosophy for casing advancement is that a retrievable eccentric system, such as Odex, is the ideal for shorter holes whereas for deeper and larger diameters holes concentric systems are the best solutions. Thanks to its concentric system, Symmetrix can drill through almost any ground condition. Whether there's sand or boulders, Symmetrix drills on until the required depth is reached.

### **Not only a product – its a drilling concept**

Over the past ten years, Symmetrix has replaced many other methods, such as auger drilling, pile driving etc.

Its simplicity and efficiency has opened many engineering consultants eyes to alternative methods for foundations and reinforcement work. Today this product is used in micropiling, underpinning, anchoring, tunneling, marine work and horizontal drilling - to name a few. All this work can be carried out quicker and deadlines made tighter.

### **Straighter and faster**

When piling, it's imperative that the casing pipe is drilled at exactly the right angle. Any slight deviation means the supporting capabilities are weakened. That's where Symmetrix is outstanding. With no extra reaming wings, the concentric drill heads drives

straight through any obstacles without straying from it's goal. And thanks to the optimum drill bit design, the job is done quickly and efficiently.

### **From DTH rigs to cranes**

Symmetrix is highly flexible and can be used on a wide range of drill rigs. The most common being DTH rigs. When very long casings are needed, cranes can be easily adapted to use DTH hammers. And as Symmetrix requires less torque than other overburden drilling systems, smaller rigs such as exploration and topammer rigs can be used with excellent results.



### A unique concentric drill bit design

Symmetrix consists of three main components.

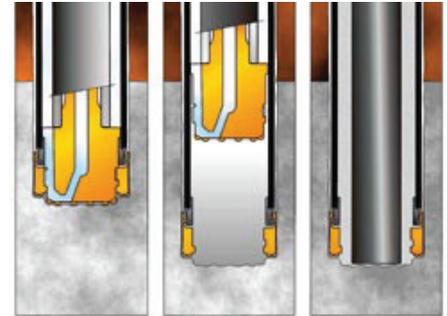
- A pilot bit that drills and guides the drillstring.
- A casing shoe that's welded onto the casing pipe.
- A ring bit that, together with the pilot bit, drills the hole and makes room for the casing to advance down the hole.

There are three different types of ring bit and casing shoe assemblies.

- A solitary ring bit with no connection to a casing shoe.
- A welding ring that holds a ring bit and casing shoe together.
- A factory assembled ring bit set with integrated ring bit and casing shoe.

The pilot bit locks into the ring bit and commences drilling, while the casing pipe is pulled down by the pilot bit's casing shoe shoulder. Once the hole is finished, drilling rotation is reversed, the pilot bit is released and removed, leaving the casing pipe in place.

### Symmetrix casing an end-bearing pile



Advancing the casing into a rock socket

Pulling the drillstring out of the casing

Filling the casing with concrete and load-bearing elements (reinforcement bars)

### Highly versatile

Symmetrix can be used in a multitude of applications, handling casings from 76 to 1 220 mm (3" to 48") to almost any depth. There are six standard models.



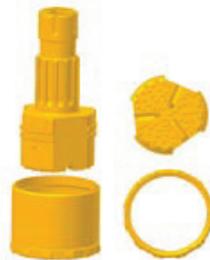
### End-bearing piles

A common method of piling where the casing is drilled into a rock socket, using Symmetrix with non-retrievable ring bits. Ideal for drilling 114 to 1 220 mm (4½" to 48") casings. A welding ring option is available from 219 mm casings while ring bit sets are available from 139 to 194 mm (5½" to 7⅞") casings.



### Skin friction piles

In this method, drilled casings are pulled out after concrete is poured in. The pile is caseless utilising the uneven contact between the ground and the poured cement slurry. Retrievable Symmetrix with ring bit sets are used for casings from 89 to 1 220 mm (3½" to 48").



### Well drilling casings

This type of equipment is ideal for water and geothermal wells. Here, the casing is drilled and cemented into the rock socket with non-retrievable Symmetrix. A DTH bit is then used to drill the well. Ideal for drilling 139 to 914 mm (5½" to 36") casings.



### Symmetrix with drill-through pilot bit

This Symmetrix system is ideal for making short rock sockets with the pilot bit. This is available in retrievable and non-retrievable versions.



### Horizontal drilling

This specialized Symmetrix system is for horizontal drilling and break-through drilling. The ring bit is recoverable. Available for drilling 139 to 1 220 mm (5½" to 48") casings.



### Tophammer rigs

As tophammer rigs are very common, Symmetrix has also been adapted to fit these rigs. Tophammer Symmetrix is available for drilling 76 to 139 mm (3" to 5½") casings.



# A multitude of applications

Over the years Atlas Copco overburden drilling systems have opened a multitude of new business opportunities for contract drillers worldwide. Here's a presentation of a few of them.



## Micropiling

Using small diameter drilled casing pipes for various types of foundation work, king posts or soldier piles. Also relatively large casings can now be drilled with smaller machines.

### **Suitable overburden system**

Mainly non-retrievable Symmetrix, for non-retrievable piling casing pipes as well as Odex.

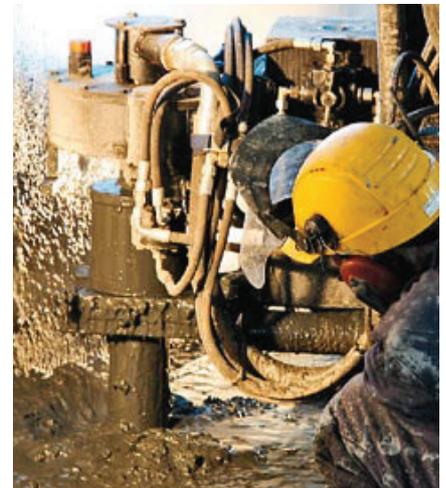


## Foundation drilling

From small to large diameter drilled casings for new foundation work or for renovation of buildings or bridge upgrading programs. This is typically done with large piling rigs or DTH-adapted cranes.

### **Suitable overburden system**

Either retrievable or non-retrievable Symmetrix for piling casing pipes or even drill-through models for drilling rock sockets with a Symmetrix pilot bit.



## Underpinning

An ingenious method of reinforcing existing foundations. Usually using small compact rigs with medium size drilled casings. Ideal in confined spaces such as tunnels, building and bridge renovations.

### **Suitable overburden system**

Mainly non-retrievable Symmetrix for piling casing pipes or drill-through models for drilling rock sockets with a Symmetrix pilot bit.

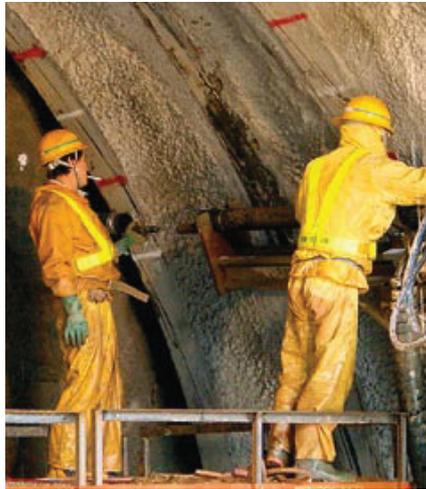


## Anchoring

A common method used for retainer wall construction, slope stabilization, seismic retrofitting and building anchoring span stays. The most common equipment used for anchoring are geotechnical drill rigs with topammer or DTH equipment.

### **Suitable overburden system**

Retrievable Symmetrix with mainly retrievable threaded anchoring casing pipes.



## Tunnelling

In modern tunnel construction with unstable ground, a fan of grouted support casings (spiles) are drilled to form a protective arch prior to tunnel advancement. Symmetrix is also ideal for face stabilization as such as drilling for dewatering and grouting holes for a TBM.

### **Suitable overburden system**

Mainly topammer Symmetrix models, for 76 - 114 mm (3 - 4½") tunnelling casing pipes.



## Marine works

Symmetrix is the most productive foundation method for marine applications. Ideal for piers, jetties, trestles and underwater drilling and blasting. This is where Symmetrix-adapted cranes are ideal.

### **Suitable overburden system**

Non-retrievable Symmetrix for integrated marine piling casing pipes.



## Well drilling

Both Symmetrix and Odex are ideal for casing water wells and geothermal wells. Symmetrix can also be used for oil and gas wells as well as to drill conductor casings.

### **Suitable overburden system**

Either Symmetrix and Odex can be used depending on size and depth of the surface casing pipe.



## Exploration drilling

An ideal method of supporting exploration holes when bulk sampling or diamond core drilling. Even popular in seismic drilling and in start casings for other forms of exploration.

### **Suitable overburden system**

Both retrievable and non-retrievable casings.



## Curtain grouting

Symmetrix is used in drilling pre-holes for curtain grouting to form a non-permeable underground wall structure.

### **Suitable overburden system**

Retrievable casings.



## Horizontal drilling

An efficient method for installing utility pipes under existing roads or buildings. Or for installing reinforced pipe roofs for underpasses. Especially useful in urban areas.

### **Suitable overburden system**

Horizontal Symmetrix for breakthrough drilling and pipe roofing. Integrated Symmetrix versions for pipe roofing with blind end.

## Special applications

Thanks to their versatility and flexibility, Symmetrix and Odex are now used in many niche applications. Secant pile walls, large diameter caissons, mechanically stabilized earth walls and explosion compaction are just a few.

### **Suitable overburden system**

The complete ranges of Symmetrix and Odex drill systems.

## Special adaptations

This versatility has also led to special adaptations of Symmetrix and Odex. For instance, we have developed a rotary drilling Symmetrix for simultaneous casing drilling. HDD applications can use adapted Symmetrix for quicker drilling and back reaming. And both Symmetrix and Odex can be adapted for drilling with plastic casing pipes.



**Atlas Copco Geotechnical Drilling and Exploration**  
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