

# Atlas Copco Overburden drilling

The ODEX method G2



# Overburden drilling

As much as 90% of the land surface of the earth is covered with loose, unconsolidated material such as soil, clay, silt, sand, gravel and boulders, which varies in depth from a few centimetres to hundreds of meters.

Drilling through this so-called overburden is often problematic, due to the tendency of the earth to cave in behind the drill bit. This makes it difficult to retrieve the drill string after the hole has been drilled. In practice, the bore hole is often lost before a casing tube can be inserted to support it.

Other problems are caused by cavities or porous ground, which interfere with the circulation of the flushing medium and prevent the drill cuttings from being flushed out of the hole.

In places where overburden strata are mixed, or when their drillability is unknown, it is difficult for the driller to decide what tools to use in order to get the best overall results without risking the loss of equipment in the hole.

*The best solution for dealing with such problems is to use ODEX equipment.*



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Designs and product range are subject to alteration without prior notice.

# The ODEX<sup>®</sup> method

ODEX equipment enables you to drill and case deep holes simultaneously in all types of formation, even those with large boulders. Casing diameters from 89 mm (ODEX 76) to 273 mm (ODEX 240) can be used.

The method is based on a pilot bit and eccentric reamer, which together drill a hole slightly larger than the external diameter of the casing tube. This enables the casing tube to follow the drill bit down the hole.

When using ODEX, part of the impact energy is diverted to the casing tube via a shoulder on the guide device, which in turn impacts a special casing shoe at the lower end of the casing.

ODEX 76 for top hammers operates with impact and rotation transmitted through extension rods. To drive the casing down the hole, this shank adapter is used to transfer part of the impact energy from the rock drill to the casing tube.

In both DTH and top hammer drilling the casing is driven down into the hole without rotation. When the casing enters the bedrock, drilling is stopped briefly, and reverse rotation applied carefully, which causes the reamer to turn in, thus reducing the overall diameter of the drill bit assembly.

When this has been accomplished, the entire drillstring can be pulled up through the inside of the casing tubes, leaving the latter embedded in the bedrock. Drilling can then be continued into the bedrock using a conventional drill string.

To improve flushing, the ODEX guide device has back-ward-pointing flushing holes.

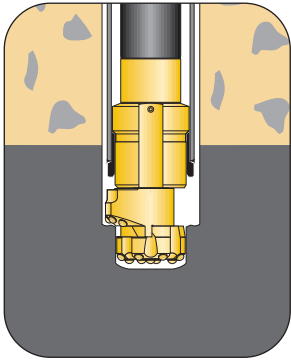
In difficult conditions, a foaming additive can be added to the compressed air to further improve flushing performance.

Commercially available steel tubes in standard dimensions are used for the casing. They are welded together and left in the ground after the hole has been completed (**ODEX W**).

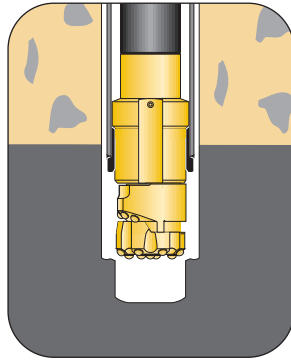
For applications where the casing is to be reused, it generally pays to use threaded casing tubes (**ODEX-T**).

Optimum utilization of any product is naturally dependent on correct handling. Service and training are therefore a very important part of our product program. Atlas Copco can offer complete training packages for both operators and maintenance personnel.

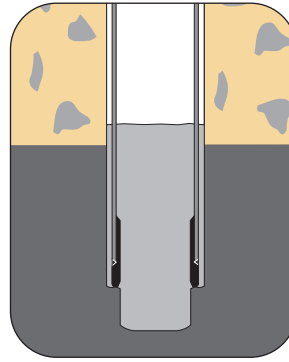
# ODEX drilling step-by-step:



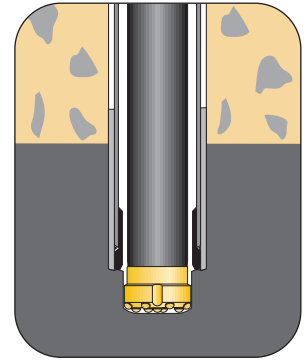
**1** When drilling starts, the ODEX reamer swings out and reams the pilot-hole wide enough for the casing tube to slide down behind the drill bit assembly.



**2** When the required depth is reached, rotation is reversed, whereupon the reamer swings in, allowing the drill bit assembly to be pulled up through the casing.



**3** Casing tubes that are to be left in the drill hole should be sealed at the bottom of the hole by means of cement grout or some other sealing agent.



**4** Drilling continues to the desired depth in the bedrock using a conventional drillstring.

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## Rock drill recommendations

All ODEX systems require drill rigs with independent, reversible rotation, with sufficient torque to match the hole diameter and depth requirements.

ODEX 76 can be used with any pneumatic or hydraulic top-hammer that meets the above requirements, i.e. minimum rotation torque of 700 Nm at 30-40 r/min using a R38 male shank adapter.

ODEX 90 and 115 for top hammer is characterized by using a guide device with impact shoulder that drives the casing via the casing shoe.

The following ODEX dimensions are available for down-the-hole drilling:

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

Guide devices are available to fit all common hammer types.

# The ODEX G2 product range

Dimensions in mm (in)

Suitable rock drills	Drill pipes	Pilot diameter	Reamed diameter	Recommended casing dimensions	
				Weldable casing tubes	Threaded casing tubes

## ODEX for tophammer drill rigs

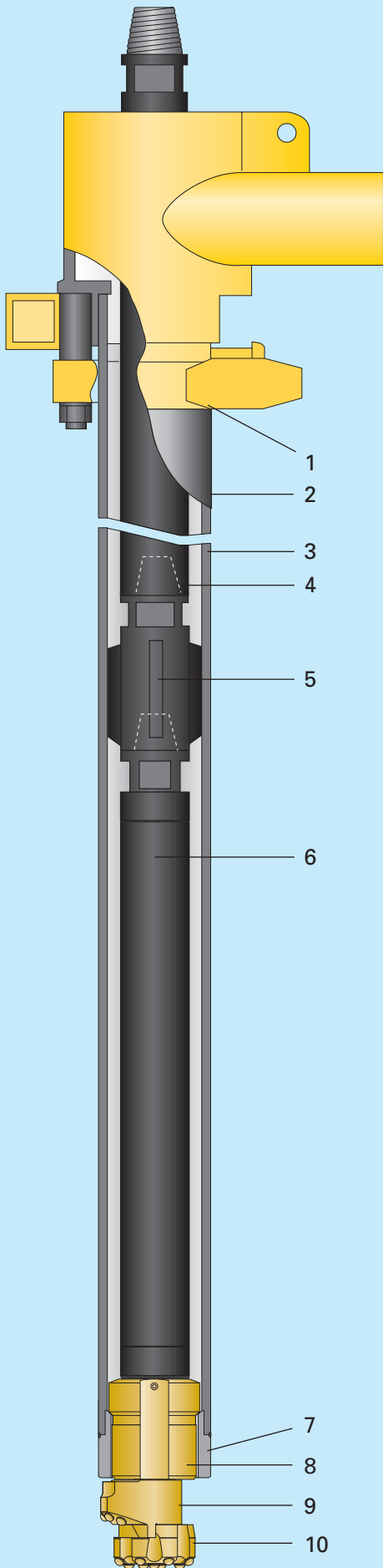
<b>ODEX 76</b>	R38	70 (2 2/3)	96 (3 25/32)	Outside diam. = Max. 89 (3 1/2) Inside diam. = min. 78 (3 1/16) Wall thickness = min. 4.5 (11/64)	Outside diam. = Max. 88.9(3 1/2) Wall thickness = 5.5 (7/32) Right-hand thread
<b>ODEX 90</b>	R32 R38 T38	90 (3 9/16)	123 (4 13/16)	Outside diam. = max. 115 (4 1/2) Inside diam. = min. 102 (4) Wall thickness = min. 5 (13/64)	Outside diam. = 114.3 (4 1/2) Wall thickness = 6.3 (1/4) Right-hand thread
<b>ODEX 115</b>	T45 T51	115 (4 1/2)	152 (6)	Outside diam. = max. 142 (5 19/32) Inside diam. = min. 128 (5 1/16) Wall thickness = min. 5 (13/64)	Outside diam. = 139.7 (5 1/2) Wall thickness = 5.8 (15/64) Right-hand thread

## ODEX for DTH drill rigs

<b>ODEX 90</b> COP 32, 34 MACH 303* IR 3.5*	76 (3)	90 (3 9/16)	123 (4 13/16)	Outside diam. = max. 115 (4 1/2) Inside diam. = min. 102 (4) Wall thickness = min. 5 (13/64)	Outside diam. = 114.3 (4 1/2) Wall thickness = 6.3 (1/4) Left-hand thread
<b>ODEX 115</b> COP 34, 42, 44 DHD 340A, DH4 A 34-15, SD4 SECOROC 4"	76 (3) 89 (3 1/2)	115 (4 1/2)	152 (6)	Outside diam. = max. 142 (5 19/32) Inside diam. = min. 128 (5 1/16) Wall thickness = min. 5 (13/64)	Outside diam. = 139.7 (5 1/2) Wall thickness = 5.8 (15/64) Left-hand thread
<b>ODEX 140</b> COP 44, 52, 54 DHD 350R, DH5 A 43-15, SD5 SECOROC 5"	89 (3 1/2)	140 (5 1/2)	181 (7 1/8)	Outside diam. = max. 171(6 22/32) Inside diam. = min. 157 (6 5/32) Wall thickness = min. 5 (13/64)	Outside diam. = 168.3 (6 5/8) Wall thickness = 6.3 (1/4) Left-hand thread
<b>ODEX 165</b> COP 54, 62, 64 DHD 360, SF6, DH6 A 53-15, SD6 SECOROC 6	114 (4 1/2)	165 (6 1/2)	209 (8 7/32)	Outside diam. = max. 196 (7 22/32) Inside diam. = min. 183 (7 3/16) Wall thickness = min. 5.5 (7/32)	Outside diam. = 193.7 (7 5/8) Wall thickness = 6.3 (1/4) Left-hand thread
<b>ODEX 190</b> COP 62, 64, 84L DHD 360, SF6, DH6 A 53-15, SD6, A63-15 SECOROC 8"L	114 (4 1/2)	190 (7 1/2)	237 (9 5/16)	Outside diam. = max. 222 (8 3/4) Inside diam. = min. 205 (8 1/16) Wall thickness = min. 6.3 (1/4)	Threaded casing tubes not available
<b>ODEX 240</b> COP 84L, 84HP DHD 380, A 63-15 SD-8	114 (4 1/2)	240 (9 1/2)	306.5 (12 4/8)	Outside diam. = max. 273 (10 3/4) Inside diam. = min. 260(10 1/4) Wall thickness = min. 6.3 (1/4)	Threaded casing tubes not available

\*) = Non standard

# ODEX 90T-G2



## Type of hammer

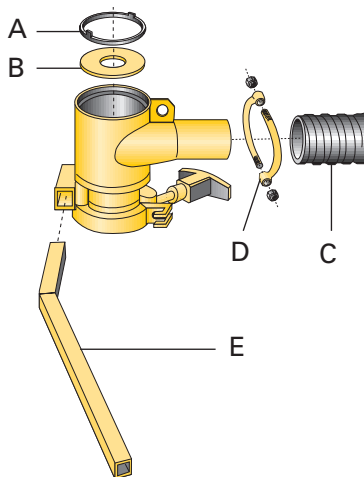
Description	Specifications
1 <b>Discharge/ Diverter head</b>	Complete, O.D. 190 mm For 76 mm hose (not incl.) Spare parts and hoses, see below
2 <b>Adapter sleeve</b>	Used with discharge head
3a <b>Start casing tube</b>	One piece per bore hole Length 2975 mm excl. thread Incl. Casing shoe 8393 8191-42
3b <b>Casing tube</b>	L.H. thread, O.D. 114.3 mm Wall thickness 6.3 mm ★ Length 3000 mm
4a <b>Start drill pipe</b>	One piece per drill string (see page 32)
4b <b>Drill pipe</b>	2 3/8 API Reg. diameter 76 mm (3") Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm
5 <b>Guide sleeve</b>	2 3/8 API Reg. effective length 225 mm Wrench flats 65 mm
6 <b>DTH-hammer</b>	Thread 2 3/8 API Reg. Pin
7 <b>Casing shoe</b>	Surface hardened Included in Start casing tube (3a)
8 <b>Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
9 <b>Reamer</b>	★★ Reaming diameter 123 mm (4 27/32)
10 <b>Pilot bit</b>	★★ Diameter 90 mm (3 9/16)

★ Below alternatives of casings and pipes, are available as standard

Length (in mm)	Casing tube Part No.	Drill pipe Ø 76 Part No.
1000	8393 8191-01	8484 0201-02
1500	8393 8191-11	8484 0201-01
2000	8393 8191-21	8484 0201-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	4 x 12.7	1 x 11
Pilot bit	8 x 11	5 x 11

	<b>Atlas Copco COP 34</b>	<b>Atlas Copco COP 32</b>	<i>Halco Mach 303</i>	<i>Ingersoll-Rand 3.5"</i>	<i>SECOROC 3"</i>
	Product No.	Product No.	Product No	Product No	Product No
	8484 0211-27	8484 0211-27	8484 0211-27	8484 0211-27	8484 0211-27
	8484 0140-38	8484 0140-38	8484 0140-38	8484 0140-38	8484 0140-38
	8393 8191-54	8393 8191-54	8393 8191-54	8393 8191-54	8393 8191-54
	8393 8191-31	8393 8191-31	8393 8191-31	8393 8191-31	8393 8191-31
	8484 0143-68	8484 0143-68	8484 0143-68	8484 0143-68	8484 0143-68
	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03
	8484 0140-40	8484 0140-40	8484 0140-40	8484 0140-40	8484 0140-40
	8311 0905-14	8311 0903-21	—	—	—
	8393 8191-42	8393 8191-42	8393 8191-42	8393 8191-42	8393 8191-42
	8393 8602-07 0795 9279-00 0795 2011-01	8393 8602-03 0795 2011-01	8393 8602-04 0795 2005-01 0795 2011-01	8393 8602-06 0795 2005-02 0795 2011-01	8393 8602-03 0795 2011-01
	8393 8602-02	8393 8602-02	8393 8602-02	8393 8602-02	8393 8602-02
	8393 8602-01	8393 8602-01	8393 8602-01	8393 8602-01	8393 8602-01



#### **Discharge/Diverter head**

	<b>Part Number</b>
A Lock ring . . . . .	8484 0140-59
B Rubber seal. . . . .	8484 0140-30
C Hose, length 25 m, to be obtained locally. . . . .	—
D Hose clamp. . . . .	8484 0140-61
E Lock rod . . . . .	8484 0140-58

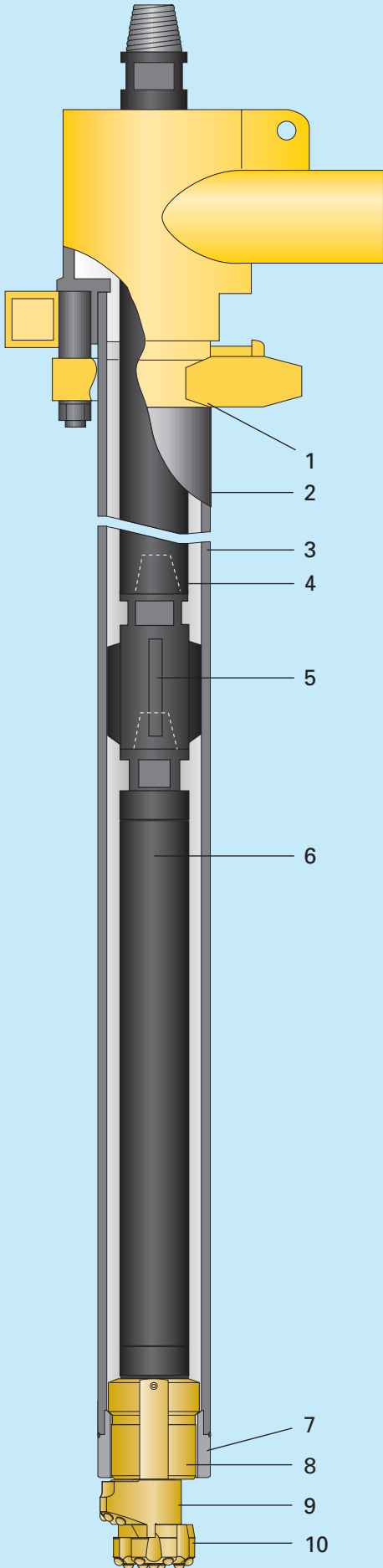
#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-14
Wrench for drill pipe, grouting device, guide sleeve. . . . .	8484 0211-00
Wrench for guide device . . . . .	8484 0211-08

**Grouting device** Wrench flats 65 mm, hose connection R1" . . . . 8484 0140-45

Further information on pages 30-31

# ODEX 115T-G2



## Type of hammer

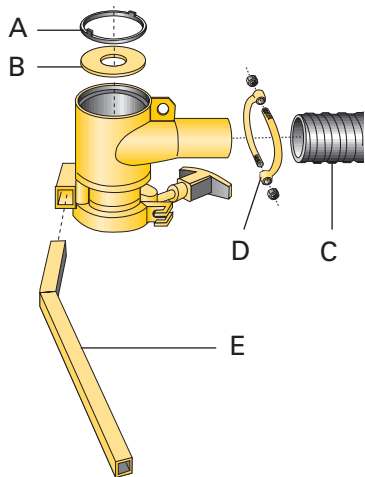
Description	Specifications
1 <b>Discharge/ Diverter head</b>	Complete, O.D. 220 mm For 102 mm hose (not incl.) Spare parts and hoses, see below
2 <b>Adapter sleeve</b>	Used with discharge head
3a <b>Start casing tube</b>	One piece per bore hole Length 2980 mm excl. thread Incl. Casing shoe 8393 8178-04
3b <b>Casing tube</b>	L.H. thread, O.D. 139.7 mm Wall thickness 5.8 mm ★ Length 3000 mm
4a <b>Start drill pipe</b>	One piece per drill string (32)
4b <b>Drill pipe</b>	2 3/8 API Reg. diameter 76 mm (3) Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm
	2 3/8 API Reg. diameter 89 mm (3 1/2) Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm
5 <b>Guide sleeve</b>	2 3/8 API Reg. effective length 225 mm Wrench flats 65 mm
6 <b>DTH-hammer</b>	
7 <b>Casing shoe</b>	Surface hardened Included in Start casing tube (3a)
8 <b>Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
9 <b>Reamer</b>	★★ Reaming diameter 152 mm (6)
10 <b>Pilot bit</b>	★★ Diameter 115 mm (4 1/2)

★ Below alternatives of casings and pipes, are available as standard

Length (in mm)	Casing tube Part Number	Drill pipe Ø 76 Part Number	Drill pipe Ø 89 Part Number
1000	8393 8178-56	8484 0201-02	8484 0141-55
1500	8393 8178-07	8484 0201-01	8484 0201-04
2000	8393 8178-49	8484 0201-91	8484 0201-92

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	4 x 14.5	1 x 12.7
Pilot bit	8 x 14.5	8 x 14.5

<b>Atlas Copco COP 34</b>	<b>Atlas Copco COP 42</b>	<b>Atlas Copco COP 44</b>	<i>Mission A34-15/SD4</i>	<i>Ingersoll-Rand DHD340A/DH4</i>	<i>SECOROC 4"</i>
Product No.	Product No.	Product No.	Product No	Product No	Product No
8484 0211-29	8484 0211-29	8484 0211-29	8484 0211-29	8484 0211-29	8484 0211-29
8484 0140-23	8484 0140-23	8484 0140-23	8484 0140-23	8484 0140-23	8484 0140-23
8393 8178-75	8393 8178-75	8393 8178-75	8393 8178-75	8393 8178-75	8393 8178-75
8393 8178-15	8393 8178-15	8393 8178-15	8393 8178-15	8393 8178-15	8393 8178-15
8484 0144-40	8484 0144-40	8484 0144-40	8484 0141-71	8484 0144-36	8484 0144-40
8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03
8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05
8484 0141-43	8484 0141-43	8484 0141-43	8484 0141-43	8484 0141-43	8484 0141-43
8311 0905-14	—	8311 0905-50	—	—	—
8393 8178-04	8393 8178-04	8393 8178-04	8393 8178-04	8393 8178-04	8393 8178-04
8393 8603-06 0795 9279-00 0795 2011-02	8393 8603-04 — 0795 2011-02	8393 8603-03 0795 9237-00 0795 2011-02	8393 8603-05 0795 9214-00 0795 2011-02	8393 8603-03 0795 9237-00 0795 2011-02	8393 8603-03 0795 9237-00 0795 2011-02
8393 8603-02	8393 8603-02	8393 8603-02	8393 8603-02	8393 8603-02	8393 8603-02
8393 8603-01	8393 8603-01	8393 8603-01	8393 8603-01	8393 8603-01	8393 8603-01



**Discharge/Diverter head**

	<b>Part Number</b>
A Lock ring . . . . .	8484 0140-62
B Rubber seal, 76 mm pipe . . . . .	8484 0140-29
B Rubber seal, 89 mm pipe . . . . .	8484 0140-22
C Hose, length 25 m, to be obtained locally . . . . .	—
D Hose clamp . . . . .	8484 0140-64
E Lock rod . . . . .	8484 0140-58

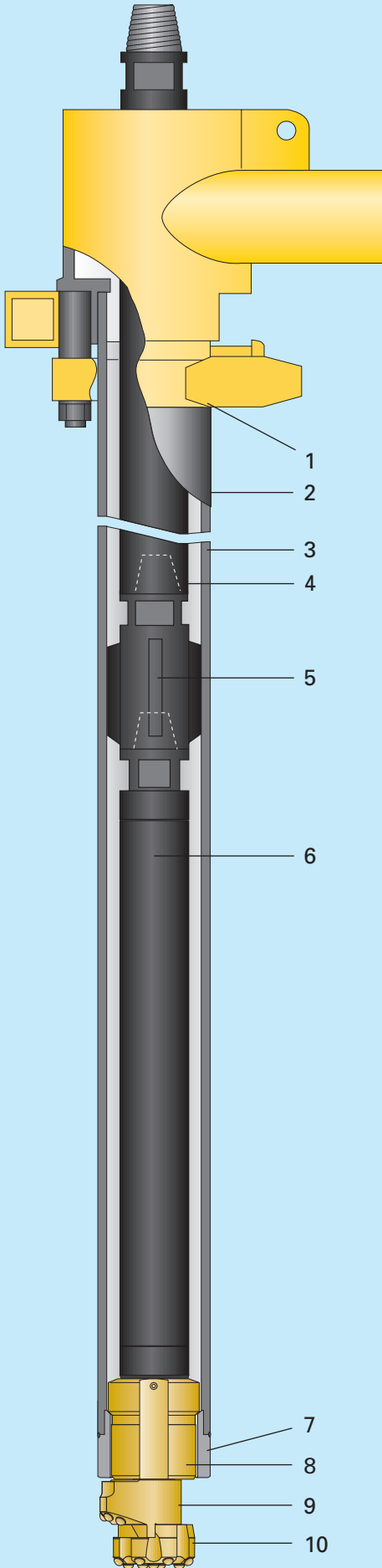
**Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-17
Wrench for drill pipe, guide sleeve . . . . .	8484 0211-00
Wrench for guide device . . . . .	8484 0211-06
Wrench for grouting device . . . . .	8484 0211-44

**Grouting device** Wrench flats 65 mm, hose connection R1" . . . . 8484 0140-24

Further information on pages 30-31.

# ODEX 140T-G2



## Type of hammer

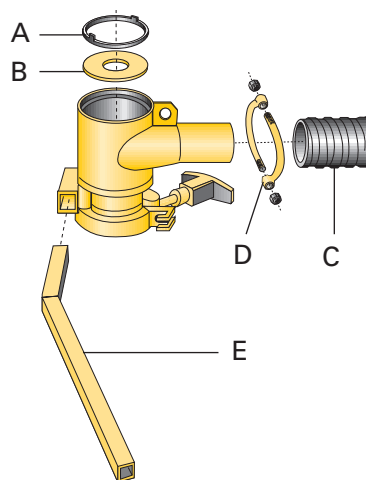
Description	Specifications
1 <b>Discharge/ Diverter head</b>	Complete, O.D. 254 mm For 102 mm hose (not incl.) Spare parts and hoses, see below
2 <b>Adapter sleeve</b>	Used with discharge head
3a <b>Start casing tube</b>	One piece per bore hole Length 2980 mm excl. thread Incl. Casing shoe 8393 8180-94
3b <b>Casing tube</b>	L.H. thread, O.D. 168.3 mm Wall thickness 6.3 mm ★ Length 3000 mm
4a <b>Start drill pipe</b>	One piece per drill string (see page 32)
4b <b>Drill pipe</b>	2 3/8 API Reg. diameter 89 mm (3 1/2) Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm
5 <b>Guide sleeve</b>	2 3/8 API Reg. effective length 225 mm Wrench flats 65 mm  Alt. 3 1/2 API Reg. - 2 3/8 API Reg. Effective length 295 mm, wrench flats 95 mm  Alt. 3 1/2 API Reg. - 3 1/2 API Reg. Effective length 250 mm, wrench flats 95 mm
6 <b>DTH-hammer</b>	Thread 2 3/8 API Reg. Thread 3 1/2 API Reg.
7 <b>Casing shoe</b>	Surface hardened Included in Start casing tube (3a)
8 <b>Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
9 <b>Reamer</b>	★★ Reaming diameter 181 mm (7 1/8)
10 <b>Pilot bit</b>	★★ Diameter 140 mm (5 1/2)

★ Below alternatives of casings and pipes, are available as standard

Length (in mm)	Casing tube Part Number	Drill pipe Ø 89 Part Number	Drill pipe Ø 114 Part Number
1000	8393 8180-29	8484 0141-55	8484 0141-90
1500	8393 8180-37	8484 0201-04	8484 0201-08
2000	8393 8180-45	8484 0201-92	8484 0141-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	5 x 14.5	1 x 14.5
Pilot bit	8 x 14.5	8 x 14.5

<b>Atlas Copco COP 44</b>	<b>Atlas Copco COP 52</b>	<b>Atlas Copco COP 54</b>	<i>Mission A43-15/SD5</i>	<i>Ingersoll-Rand DHD350R/DH5</i>	<i>SECOROC 5"</i>
Product No.	Product No.	Product No.	Product No	Product No	Product No
8484 0211-31	8484 0211-31	8484 0211-31	8484 0211-31	8484 0211-31	8484 0211-31
8484 0140-37	8484 0140-37	8484 0140-37	8484 0140-37	8484 0140-37	8484 0140-37
8393 8180-88	8393 8180-88	8393 8180-88	8393 8180-88	8393 8180-88	8393 8180-88
8393 8180-52	8393 8180-52	8393 8180-52	8393 8180-52	8393 8180-52	8393 8180-52
8484 0144-40	8484 0141-71	8484 0141-71	8484 0144-37	8484 0144-38	8484 0144-36
8484 0201-05	8484 0201-05	8484 0210-05	8484 0210-05	8484 0210-05	8484 0201-05
8484 0141-44	8484 0141-44	8484 0141-44			
8484 0140-41	8484 0140-41	8484 0140-41	8484 0140-41	8484 0140-41	8484 0140-41
8484 0141-49	8484 0141-49	8484 0141-49	8484 0141-49	8484 0141-49	8484 0141-49
8311 0905-50 —	— —	8311 0905-60 8311 0905-70	— —	— —	— —
8393 8180-94	8393 8180-94	8393 8180-94	8393 8180-94	8393 8180-94	8393 8180-94
8393 8604-04 0795 9237-00 0795 2011-03	8393 8604-06 — 0795 2011-03	8393 8604-03 0795 9236-00 0795 2011-03	8393 8604-05 0795 9215-00 0795 2011-03	8393 8604-03 0795 9236-00 0795 2011-03	8393 8604-03 0795 9236-00 0795 2011-03
8393 8604-02	8393 8604-02	8393 8604-02	8393 8604-02	8393 8604-02	8393 8604-02
8393 8604-01	8393 8604-01	8393 8604-01	8393 8604-01	8393 8604-01	8393 8604-01



#### **Discharge/Diverter head**

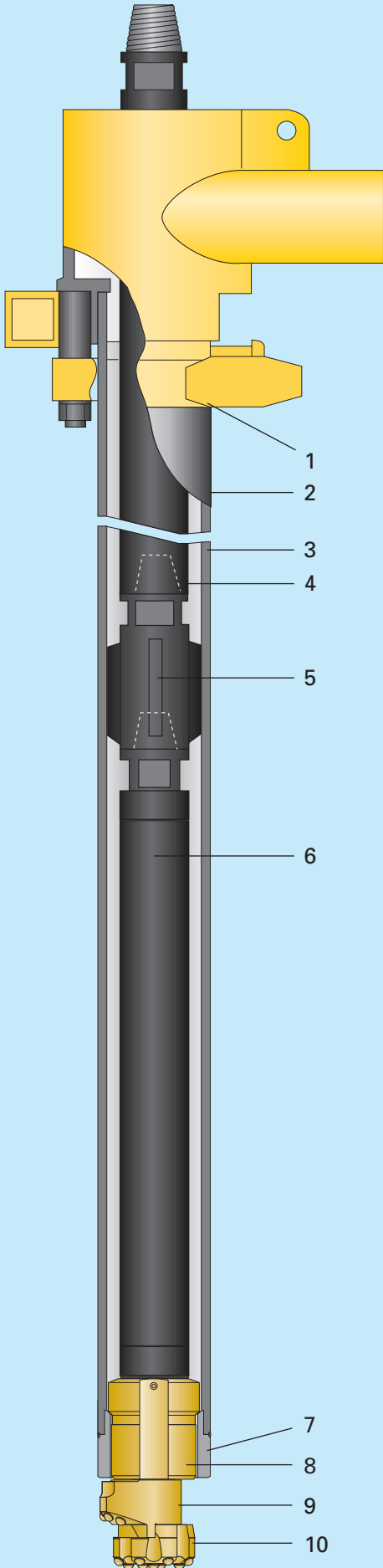
	<b>Part No.</b>
A Lock ring . . . . .	8484 0140-65
B Rubber seal, 89 mm pipe . . . . .	8484 0140-31
B Rubber seal, 114 mm pipe . . . . .	8484 0140-32
C Hose, length 25 m, to be obtained locally. . . . .	—
D Hose clamp. . . . .	8484 0140-64
E Lock rod . . . . .	8484 0140-58

#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-18
Wrench for drill pipe, guide sleeve 2 3/8 API Reg. . . . .	8484 0211-00
Wrench for guide sleeve 3 1/2 API Reg. . . . .	8484 0211-02
Wrench for guide device . . . . .	8484 0211-04
Wrench for grouting device . . . . .	8484 0211-44

**Grouting device** Wrench flats 140 mm, hose connection R1" . . . 8484 0140-46  
Further information on pages 30-31.

# ODEX 165T-G2



## Type of hammer

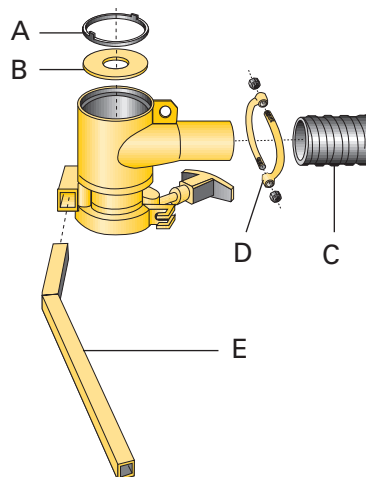
Description	Specifications
1 <b>Discharge/ Diverter head</b>	Complete, O.D. 254 mm For 102 mm hose (not incl.) Spare parts and hoses, see below
2 <b>Adapter sleeve</b>	Used with discharge head
3a <b>Start casing tube</b>	One piece per bore hole Length 2980 mm excl. thread Incl. Casing shoe 8393 8179-54
3b <b>Casing tube</b>	L.H. thread, O.D. 193.7 mm Wall thickness 6.3 mm ★ Length 3000 mm
4a <b>Start drill pipe</b>	One piece per drill string (see page 32)
4b <b>Drill pipe</b>	3 1/2 API Reg. diameter 114 mm (4 1/2) Wall thickness 6.3 mm, wrench flats 95 mm ★ Length 3000 mm
5 <b>Guide sleeve</b> Wrench flats 95 mm	3 1/2 API Reg. effective length 250 mm
6 <b>DTH-hammer</b>	Thread 3 1/2 API Reg.
7 <b>Casing shoe</b>	Surface hardened Included in Start casing tube (3a)
8 <b>Guide device</b> - Foot valve - Locking kit	Plastic See page 32-33
9 <b>Reamer</b>	★★ Reaming diameter 209 mm (8 7/32)
10 <b>Pilot bit</b>	★★ Diameter 165 mm (6 1/2)

★ Below alternatives of casings and pipes, are available as standard

Length (in mm)	Casing tube Part Number	Drill pipe Ø 114 Part Number
1000 mm	8393 8179-55	8484 0141-90
1500 mm	8393 8179-63	8484 0201-08
2000 mm	8393 8179-71	8484 0141-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	5 x 16	1 x 16
Pilot bit	8 x 16	9 x 16

<b>Atlas Copco COP 54</b>	<b>Atlas Copco COP 62</b>	<b>Atlas Copco COP 64</b>	<i>Mission A53-15/SD6</i>	<i>Ingersoll-Rand DHD360/DH6</i>	<i>SECOROC 6"</i>
Product No.	Product No.	Product No.	Product No	Product No	Product No
8484 0211-33	8484 0211-33	8484 0211-33	8484 0211-33	8484 0211-33	8484 0211-33
8484 0140-39	8484 0140-39	8484 0140-39	8484 0140-39	8484 0140-39	8484 0140-39
8393 8179-99	8393 8179-99	8393 8179-99	8393 8179-99	8393 8179-99	8393 8179-99
8393 8179-89	8393 8179-89	8393 8179-89	8393 8179-89	8393 8179-89	8393 8179-89
8484 0144-40	8484 0144-41	8484 0144-41	8484 0144-42	8484 0144-41	8484 0144-41
8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09
8484 0141-50	8484 0141-50	8484 0141-50	8484 0141-50	8484 0141-50	8484 0141-50
8311 0905-70	—	8311 0905-80	—	—	—
8393 8179-54	8393 8179-54	8393 8179-54	8393 8179-54	8393 8179-54	8393 8179-54
8393 8605-06 0795 9236-00 0795 2011-04	8393 8605-04 — 0795 2011-04	8393 8605-03 0795 9235-00 0795 2011-04	8393 8605-05 0795 9216-00 0795 2011-04	8393 8605-03 0795 9235-00 0795 2011-04	8393 8605-03 0795 9235-00 0795 2011-04
8393 8605-02	8393 8605-02	8393 8605-02	8393 8605-02	8393 8605-02	8393 8605-02
8393 8605-01	8393 8605-01	8393 8605-01	8393 8605-01	8393 8605-01	8393 8605-01



#### **Discharge/Diverter head**

	<b>Part No.</b>
A Lock ring . . . . .	8484 0140-66
B Rubber seal . . . . .	8484 0140-33
C Hose, length 25 m, to be obtained locally . . . . .	—
D Hose clamp . . . . .	8484 0140-64
E Lock rod . . . . .	8484 0140-58

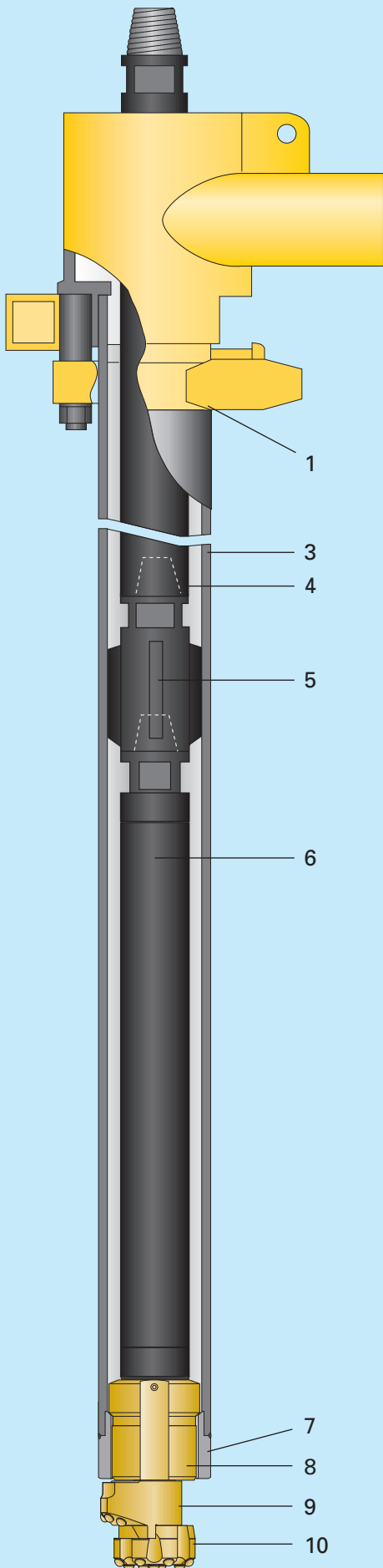
#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-05
Wrench for drill pipe, guide sleeve . . . . .	8484 0211-02
Wrench for guide device . . . . .	8484 0211-07
Wrench for grouting device . . . . .	8484 0211-44

**Grouting device** Wrench flats 140 mm, hose connection R1" . . . 8484 0140-68

Further information on pages 30-31.

# ODEX 90W-G2



## Type of hammer

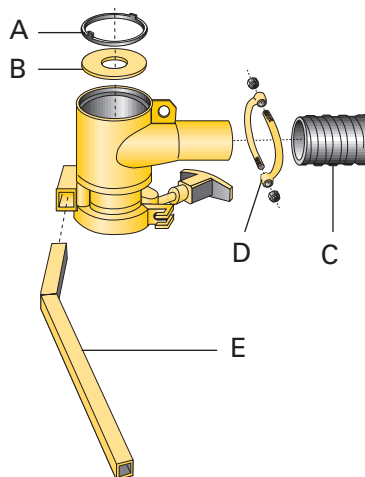
Description	Specifications
<b>1 Discharge/ Diverter head</b>	Complete, O.D. 190 mm For 76 mm hose (not incl.) Spare parts and hoses, see below
<b>3 Casing tube</b>	Weldable, O.D. max. 115 mm,  I.D. min. 102 mm Wall thickness min. 5.0 mm
<b>4a Start drill pipe</b>	One piece per drill string (see page 32)
<b>4b Drill pipe</b>	2 3/8 API Reg. diameter 76 mm (3) Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm
<b>5 Guide sleeve</b>	2 3/8 API Reg. effective length 225 mm Wrench flats 65 mm
<b>6 DTH-hammer</b>	Thread 2 3/8 API Reg.
<b>7 Casing shoe</b>	Surface hardened  Not surface hardened
<b>8 Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
<b>9 Reamer</b>	★★ Reaming diameter 123 mm (4 27/32)
<b>10 Pilot bit</b>	★★ Diameter 90 mm (3 9/16)

★ Below alternatives of drill pipes, are available as standard

Length (mm)	Drill pipe Ø 76 Part Number
1000	8484 0201-02
1500	8484 0201-01
2000	8484 0201-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	4 x 12.7	1 x 11
Pilot bit	8 x 11	5 x 11

	<b>Atlas Copco COP 34</b>	<b>Atlas Copco COP 32</b>	<i>Halco MACH 303</i>	<i>Ingersoll-Rand 3.5"</i>	<i>SECOROC 3"</i>
	Product No.	Product No.	Product No	Product No	Product No
	8484 0211-27	8484 0211-27	8484 0211-27	8484 0211-27	8484 0211-27
	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally
	8484 0143-68	8484 0143-68	8484 0143-68	8484 0143-18	8484 0143-18
	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03
	8484 0140-40	8484 0140-40	8484 0140-40	8484 0140-40	8484 0140-40
	8311 0905-14	8311 0903-21	—	—	—
	8393 8191-42	8393 8191-42	8393 8191-42	8393 8191-42	8393 8191-42
	8393 8191-41	8393 8191-41	8393 8191-41	8393 8191-41	8393 8191-41
	8393 8602-07 0795 9279-00 0795 2011-01	8393 8602-03 — 0795 2011-01	8393 8602-04 0795 2005-01 0795 2011-01	8393 8602-06 0795 2005-02 0795 2011-01	8393 8602-03 — 0795 2011-01
	8393 8602-02	8393 8602-02	8393 8602-02	8393 8602-02	8393 8602-02
	8393 8602-01	8393 8602-01	8393 8602-01	8393 8602-01	8393 8602-01



#### **Discharge/Diverter head**

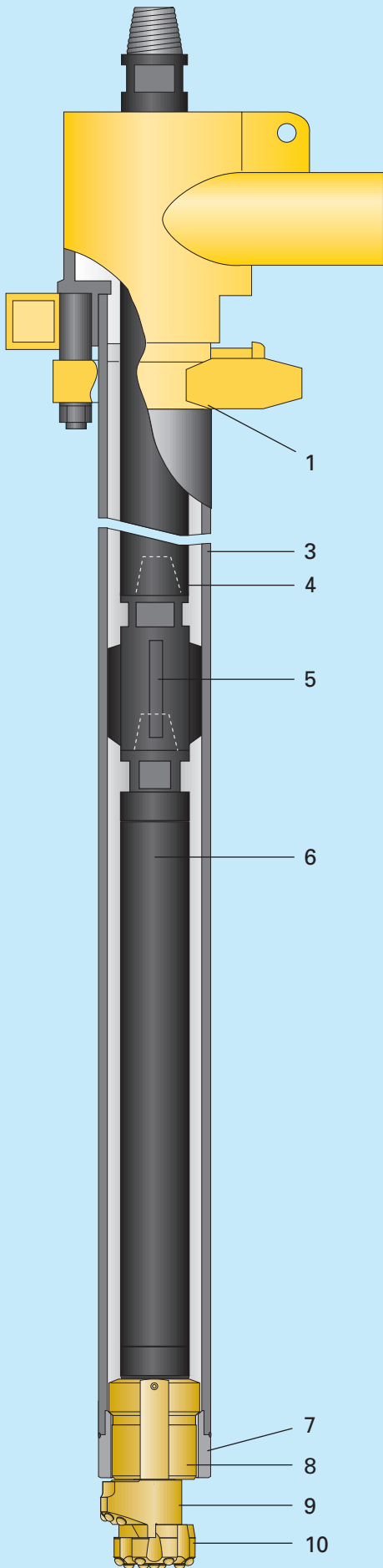
	<b>Part No.</b>
A Lock ring . . . . .	8484 0140-59
B Rubber seal . . . . .	8484 0140-30
C Hose, length 25 m, to be obtained locally . . . . .	—
D Hose clamp . . . . .	8484 0140-61
E Lock rod . . . . .	8484 0140-58

#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-14
Wrench for drill pipe, guide sleeve . . . . .	8484 0211-00
Wrench for guide device . . . . .	8484 0211-08

Further information on page 30-31.

# ODEX 115W-G2



## Type of hammer

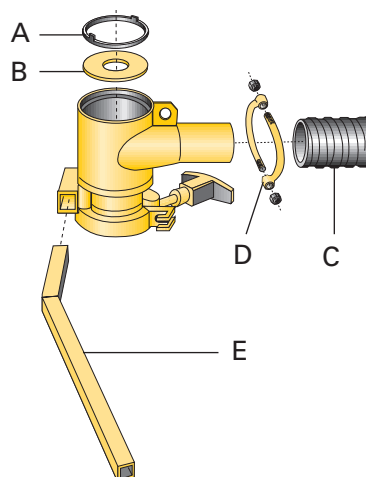
Description	Specifications
1 <b>Discharge/ Diverter head</b>	Complete, O.D. 220 mm For 102 mm hose (not incl.) Spare parts and hoses, see below
3 <b>Casing tube</b>	Weldable, O.D. max. 142 mm, I.D. min. 128 mm Wall thickness min. 5.0 mm
4a <b>Start drill pipe</b>	One piece per drill string (see page 32)
4b <b>Drill pipe</b>	2 3/8 API Reg. diameter 76 mm (3) Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm  2 3/8 API Reg. diameter 89 mm (3 1/2) Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm
5 <b>Guide sleeve</b>	2 3/8 API Reg. effective length 225 mm Wrench flats 65 mm
6 <b>DTH-hammer</b>	Thread 2 3/8 API Reg.
7 <b>Casing shoe</b>	Surface hardened Not surface hardened
8 <b>Guide device - Foot valve Locking kit</b>	Plastic See page 32-33
9 <b>Reamer</b>	★★ Reaming diameter 152 mm (6)
10 <b>Pilot bit</b>	★★ Diameter 115 mm (4 1/2)

★ Below alternatives of drill pipes, are available as standard

Length (in mm)	Drill pipe Ø 76 Part Number	Drill pipe Ø 89 Part Number
1000	8484 0201-02	8484 0141-55
1500	8484 0201-01	8484 0201-04
2000	8484 0201-91	8484 0201-92

★★ Buttons	No. x size mm	Front
	Gauge	
Reamer	4 x 14.5	1 x 12.7
Pilot bit	8 x 14.5	8 x 14.5

<b>Atlas Copco COP 34</b>	<b>Atlas Copco COP 42</b>	<b>Atlas Copco COP 44</b>	<i>Mission A34-15/SD4</i>	<i>Ingersoll-Rand DHD340A/DH4</i>	<i>SECOROC 4"</i>
Product No.	Product No.	Product No.	Product No	Product No	Product No
8484 0211-29	8484 0211-29	8484 0211-29	8484 0211-29	8484 0211-29	8484 0211-29
to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally
8484 0141-71	8484 0141-71	8484 0141-71	8484 0144-36	8484 0144-37	8484 0141-71
8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03	8484 0201-03
8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05
8484 0141-43	8484 0141-43	8484 0141-43	8484 0141-43	8484 0141-43	8484 0141-43
8311 0905-14	—	8311 0905-50	—	—	—
8393 8178-04 8393 8178-03	8393 8178-04 8393 8178-03	8393 8178-04 8393 8178-03	8393 8178-04 8393 8178-03	8393 8178-04 8393 8178-03	8393 8178-04 8393 8178-03
8393 8603-06 0795 9279-00 0795 2011-02	8393 8603-04 — 0795 2011-02	8393 8603-03 0795 9237-00 0795 2011-02	8393 8603-05 0795 9214-00 0795 2011-02	8393 8603-03 0795 9237-00 0795 2011-02	8393 8603-03 0795 9237-00 0795 2011-02
8393 8603-02	8393 8603-02	8393 8603-02	8393 8603-02	8393 8603-02	8393 8603-02
8393 8603-01	8393 8603-01	8393 8603-01	8393 8603-01	8393 8603-01	8393 8603-01



#### **Discharge/Diverter head**

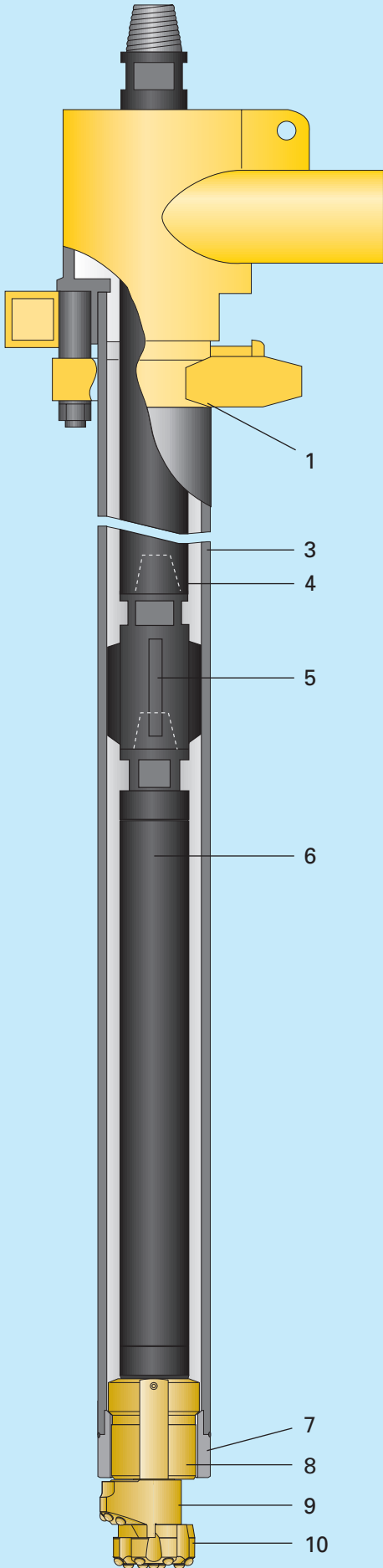
	<b>Part Number</b>
A Lock ring . . . . .	8484 0140-62
B Rubber seal, 76 mm pipe . . . . .	8484 0140-29
B Rubber seal, 89 mm pipe . . . . .	8484 0140-22
C Hose, length 25 m, to be obtained locally . . . . .	—
D Hose clamp . . . . .	8484 0140-64
E Lock rod . . . . .	8484 0140-58

#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-17
Wrench for drill pipe, guide sleeve . . . . .	8484 0211-00
Wrench for guide device . . . . .	8484 0211-06

Further information on page 30-31

# ODEX 140W-G2



## Type of hammer

Description	Specifications
<b>1 Discharge/ Diverter head</b>	Complete, O.D. 254 mm For 102 mm hose (not incl.) Spare parts and hoses, see below
<b>3 Casing tube</b>	Weldable, O.D. max. 171 mm, I.D. min. 157 mm Wall thickness min. 5.0 mm
<b>4a Start drill pipe</b>	One piece per drill string (see page 32)
<b>4b Drill pipe</b>	2 3/8 API Reg. diameter 89 mm (3 1/2) Wall thickness 4.0 mm, wrench flats 65 mm ★ Length 3000 mm
<b>5 Guide sleeve</b>	2 3/8 API Reg. Effective length 225 mm, wrench flats 65 mm
	Alt. 3 1/2 API Reg. - 2 3/8 API Reg. Effective length 295 mm, wrench flats 95 mm
	Alt. 3 1/2 API Reg. - 3 1/2 API Reg. Effective length 250 mm, wrench flats 95 mm
<b>6 DTH-hammer</b>	Thread 2 3/8 API Reg. Thread 3 1/2 API Reg.
<b>7 Casing shoe</b>	Surface hardened Not surface hardened
<b>8 Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
<b>9 Reamer</b>	★★ Reaming diameter 181 mm (7 1/2)
<b>10 Pilot bit</b>	★★ Diameter 140 mm (5 1/2)

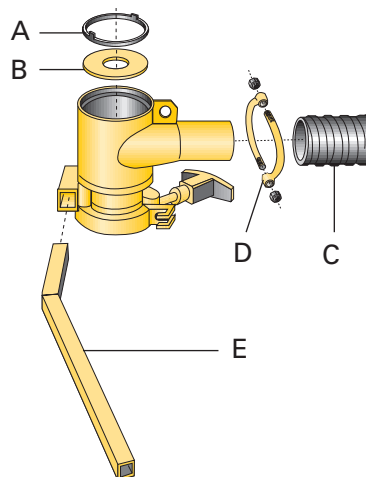
★ Below alternatives of drill pipes, are available as standard

Length (in mm)	Drill pipe Ø 89 Part Number	Drill pipe Ø 114 Part Number
1000	8484 0141-55	8484 0141-90
1500	8484 0201-04	8484 0201-08
2000	8484 0201-92	8484 0141-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	5 x 14.5	1 x 14.5
Pilot bit	8 x 14.5	8 x 14.5

<b>Atlas Copco COP 44</b>	<b>Atlas Copco COP 52</b>	<b>Atlas Copco COP 54</b>	<i>Mission A43-15/SD5</i>	<i>Ingersoll-Rand DHD350R/DH5</i>	<i>SECOROC 5"</i>
Product No.	Product No.	Product No.	Product No	Product No	Product No
8484 0211-31	8484 0211-31	8484 0211-31	8484 0211-31	8484 0211-31	8484 0211-31
to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally
8484 0144-40	8484 0144-37	8484 0144-37	8484 0144-38	8484 0144-47	8484 0144-37
8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05	8484 0201-05
8484 0141-44	8484 0141-44	8484 0141-44	—	—	8484 0141-44
8484 0140-41	8484 0140-41	8484 0140-41	8484 0140-41	8484 0140-41	8484 0140-41
8484 0141-49	8484 0141-49	8484 0141-49	8484 0141-49	8484 0141-49	8484 0141-49
8311 0905-50 —	— —	8311 0905-60 8311 0905-70	—	—	—
8393 8180-94 8393 8180-93	8393 8180-94 8393 8180 93	8393 8180-94 8393 8180 93	8393 8180-94 8393 8180 93	8393 8180-94 8393 8180 93	8393 8180-94 8393 8180 93
8393 8604-04 0795 9237-00 0795 2011-03	8393 8604-06 — 0795 2011-03	8393 8604-03 0795 9236-00 0795 2011-03	8393 8604-05 0795 9215-00 0795 2011-03	8393 8604-03 0795 9236-00 0795 2011-03	8393 8604-03 0795 9236-00 0795 2011-03
8393 8604-02	8393 8604-02	8393 8604-02	8393 8604-02	8393 8604-02	8393 8604-02
8393 8604-01	8393 8604-01	8393 8604-01	8393 8604-01	8393 8604-01	8393 8604-01



#### **Discharge/Diverter head**

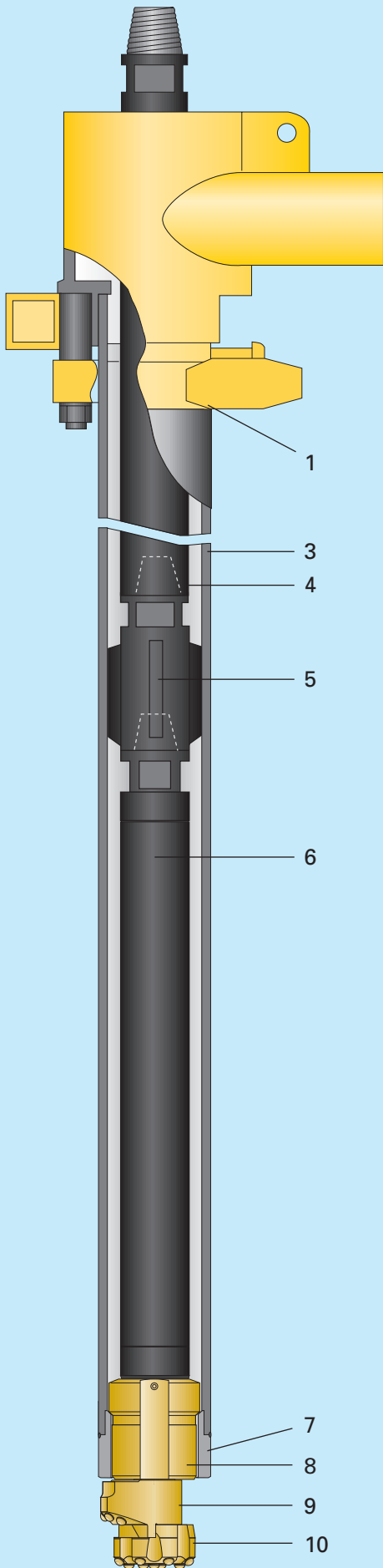
	<b>Part Number</b>
A Lock ring . . . . .	8484 0140-65
B Rubber seal . . . . .	8484 0140-31
C Hose, length 25 m, to be obtained locally . . . . .	—
D Hose clamp . . . . .	8484 0140-64
E Lock rod . . . . .	8484 0140-58

#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-18
Wrench for drill pipe, guide sleeve 2 3/8 API Reg . . . . .	8484 0211-00
Wrench for guide guide sleeve 3 1/2 API Reg . . . . .	8484 0211-02
Wrench for guide device . . . . .	8484 0211-04

Further information on pages 30-31

# ODEX 165W-G2



## Type of hammer

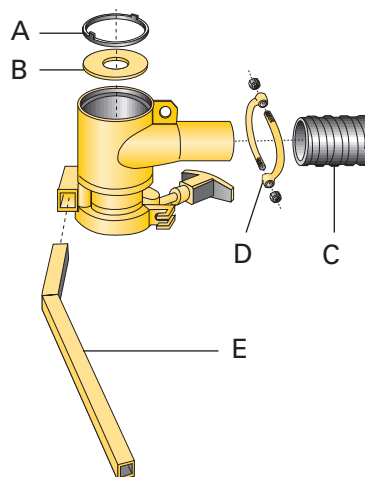
Description	Specifications
<b>1 Discharge/ Diverter head</b>	Complete, O.D. 254 mm For 102 mm hose (not incl.) Spare parts and hoses, see below
<b>3 Casing tube</b>	Weldable, O.D. max. 196 mm, I.D. min. 183 mm Wall thickness min. 5.5 mm
<b>4a Start drill pipe</b>	One piece per drill string (see page 32)
<b>4b Drill pipe</b>	3 1/2 API Reg. diameter 114 mm (4 1/2) Wall thickness 6.3 mm, wrench flats 95 mm ★ Length 3000 mm
<b>5 Guide sleeve</b>	3 1/2 API Reg. effective length 250 mm Wrench flats 95 mm
<b>6 DTH-hammer</b>	Thread 3 1/2 API Reg.
<b>7 Casing shoe</b>	Surface hardened Not surface hardened
<b>8 Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
<b>9 Reamer</b>	★★ Reaming diameter 209 mm (8 7/32)
<b>10 Pilot bit</b>	★★ Diameter 165 mm (6 1/2)

★ Below alternatives of drill pipes, are available as standard

Lenght (in mm)	Drill pipe Part Number
1000	8484 0141-90
1500	8484 0201-08
2000	8484 0141-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	5 x 16	1 x 16
Pilot bit	8 x 16	9 x 16

<b>Atlas Copco COP 54</b>	<b>Atlas Copco COP 62</b>	<b>Atlas Copco COP 64</b>	<i>Mission A53-15/SD6</i>	<i>Ingersoll-Rand DHD360/DH6</i>	<i>SECOROC 6"</i>
Product No.	Product No.	Product No	Product No	Product No	Product No
8484 0211-33	8484 0211-33	8484 0211-33	8484 0211-33	8484 0211-33	8484 0211-33
to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally
8484 0144-42	8484 0144-42	8484 0144-41	8484 0144-48	8484 0144-42	8484 0144-41
8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09
8484 0141-50	8484 0141-50	8484 0141-50	8484 0141-50	8484 0141-50	8484 0141-50
8311 0905-70	—	8311 0905-80	—	—	—
8393 8179-54 8393 8179-53	8393 8179-54 8393 8179-53	8393 8179-54 8393 8179-53	8393 8179-54 8393 8179-53	8393 8179-54 8393 8179-53	8393 8179-54 8393 8179-53
8393 8605-06 0795 9236-00 0795 2011-04	8393 8605-04 — 0795 2011-04	8393 8605-03 0795 9235-00 0795 2011-04	8393 8605-05 0795 9216-00 0795 2011-04	8393 8605-03 0795 9235-00 0795 2011-04	8393 8605-03 0795 9235-00 0795 2011-04
8393 8605-02	8393 8605-02	8393 8605-02	8393 8605-02	8393 8605-02	8393 8605-02
8393 8605-01	8393 8605-01	8393 8605-01	8393 8605-01	8393 8605-01	8393 8605-01



#### **Discharge/Diverter head**

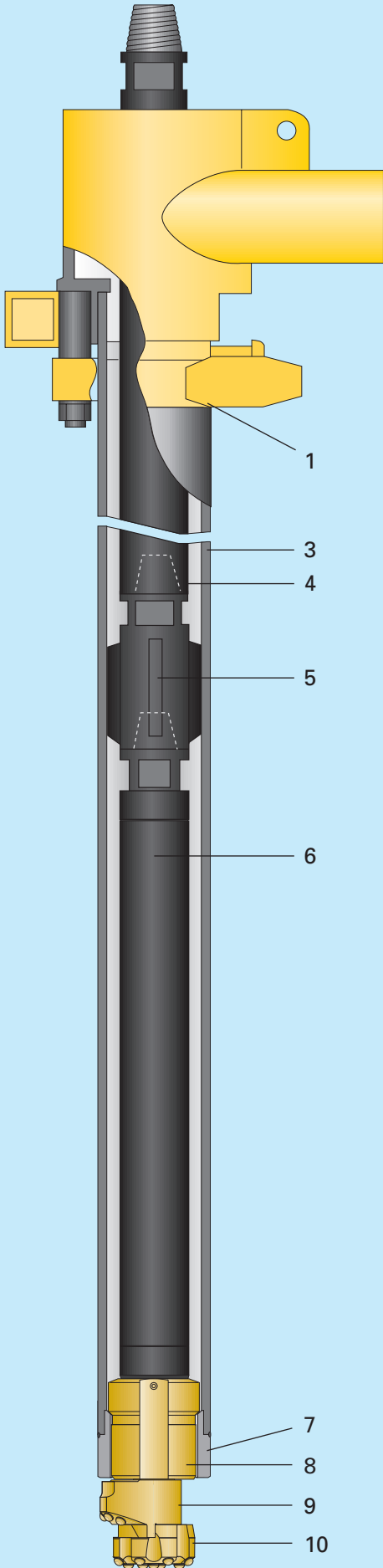
	<b>Part Number</b>
A Lock ring . . . . .	8484 0140-66
B Rubber seal. . . . .	8484 0140-33
C Hose, length 25 m, to be obtained locally. . . . .	—
D Hose clamp. . . . .	8484 0140-64
E Lock rod . . . . .	8484 0140-58

#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-05
Wrench for drill pipe, guide sleeve . . . . .	8484 0211-02
Wrench for guide device . . . . .	8484 0211-07

Further information on pages 30-31

# ODEX 190W-G2



## Type of hammer

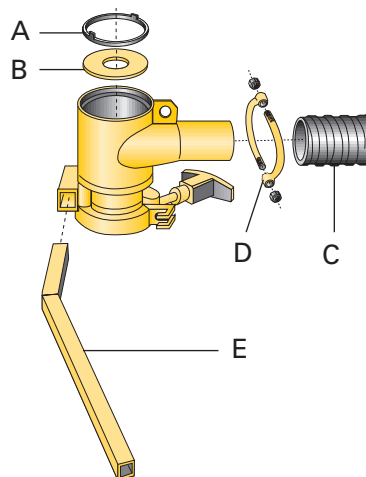
Description	Specifications
<b>1 Discharge/ Diverter head</b>	Complete, O.D. 300 mm For 127 mm hose (not incl.) Spare parts and hoses, see below
<b>3 Casing tube</b>	Weldable, O.D. max. 222 mm, I.D. min. 205 mm Wall thickness min. 6.3 mm
<b>4a Start drill pipe</b>	One piece per drill string (see page 32)
<b>4b Drill pipe</b>	3 1/2 API Reg. diameter 114 mm (4 1/2) Wall thickness 6.3 mm, wrench flats 95 mm ★ Length 3000 mm
<b>5 Guide sleeve</b>	3 1/2 API Reg. effective length 250 mm Wrench flats 95 mm  4 1/2 API Reg. - 3 1/2 API Reg. Effective length 317 mm Wrench flats 120 mm
<b>6 DTH-hammer</b>	Thread 3 1/2 API Reg. Thread 4 1/2 API Reg.
<b>7 Casing shoe</b>	Surface hardened Not surface hardened
<b>8 Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
<b>9 Reamer</b>	★★ Reaming diameter 237 mm (9 5/16)
<b>10 Pilot bit</b>	★★ Diameter 190 mm (7 1/2)

★ Below alternatives of drill pipes, are available as standard

Length (in mm)	Drill pipe Ø 114 Part Number
1000	8484 0141-90
1500	8484 0201-08
2000	8484 0141-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	5 x 16	1 x 16
Pilot bit	8 x 16	10 x 16

<b>Atlas Copco COP 62</b>	<b>Atlas Copco COP 64</b>	<b>Atlas Copco COP 84L</b>	<i>Mission A53-15/SD6</i>	<i>Mission A63-15</i>	<i>Ingersoll-Rand DHD 360/DH6</i>	<i>SECOROC 6"</i>
Product No.	Product No.	Product No.	Product No.	Product No.	Product No.	Product No.
8484 0211-45	8484 0211-45	8484 0211-45	8484 0211-45	8484 0211-45	8484 0211-45	8484 0211-45
to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally
8484 0144-41	8484 0144-41	8484 0144-42	8484 0144-42	8484 0144-41	8484 0144-42	8484 0144-41
8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09
8484 0140-42	8484 0140-42	—	8484 0140-42	—	8484 0140-42	8484 0140-42
—	—	to be advised	—	to be advised	—	—
—	8311 0905-80	—	—	—	—	—
—	—	8311 0905-92	—	—	—	—
8393 8182-02 8393 8182-01	8393 8182-02 8393 8182-01	8393 8182-02 8393 8182-01	8393 8182-02 8393 8182-01	8393 8182-02 8393 8182-01	8393 8182-02 8393 8182-01	8393 8182-02 8393 8182-01
8393 8606-04 — 0795 2011-05	8393 8606-03 0795 9235-00 0795 2011-05	8393 8606-06 0795 9217-00 0795 2011-05	8393 8606-05 0795 9216-00 0795 2011-05	8393 8606-06 0795 9217-00 0795 2011-05	8393 8606-03 0795 9235-00 0795 2011-05	8393 8606-03 0795 9235-00 0795 2011-05
8393 8606-02	8393 8606-02	8393 8606-02	8393 8606-02	8393 8606-02	8393 8606-02	8393 8606-02
8393 8606-01	8393 8606-01	8393 8606-01	8393 8606-01	8393 8606-01	8393 8606-01	8393 8606-01



#### **Discharge/Diverter head**

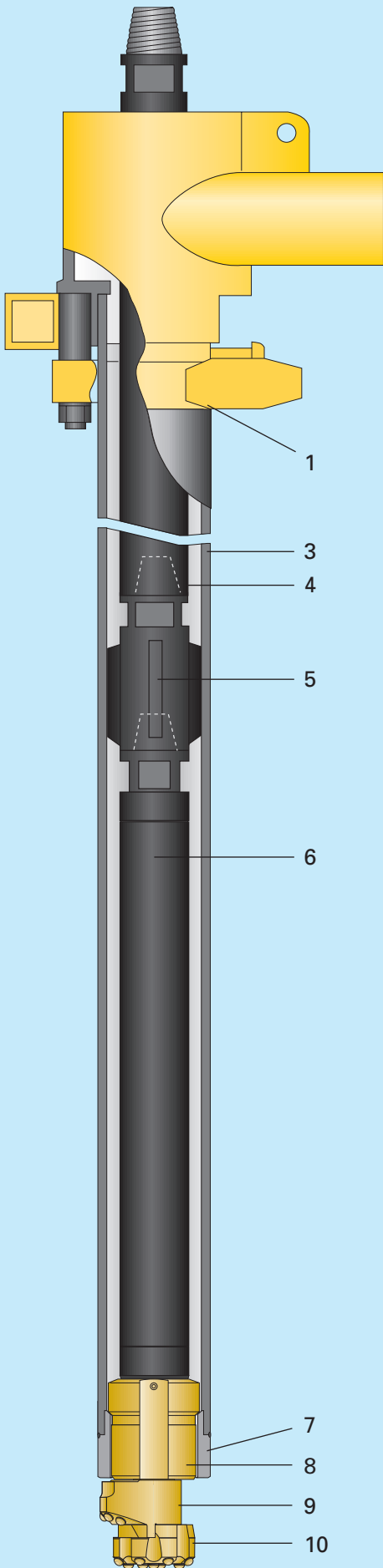
	<b>Part Number</b>
A Lock ring . . . . .	8484 0140-55
B Rubber seal . . . . .	8484 0140-34
C Hose, length 25 m, to be obtained locally . . . . .	—
D Hose clamp . . . . .	8484 0140-57
E Lock rod . . . . .	8484 0140-58

#### **Auxiliary tools**

Wrench for pilot bit . . . . .	8484 0211-47
Wrench for drill pipe, guide sleeve . . . . .	8484 0211-02
Wrench for guide device . . . . .	8484 0211-09

Further information on pages 30-31

# ODEX 240W-G2



## Type of hammer

Description	Specifications
1 <b>Discharge/ Diverter head</b>	Complete O.D. 300 mm For 127 mm hose (Not incl.)
3 <b>Casing tube</b>	Weldable O.D. max. 273 mm I.D. min. 260 mm Wall thickness min. 6.3 mm
4a <b>Start drill pipe</b>	One piece per drill string
4b <b>Drill pipe</b>	3 <sup>1</sup> / <sub>2</sub> API Reg. diameter 114 mm (4 <sup>1</sup> / <sub>2</sub> ) wall thickness 6.3 mm, wrench flats 95 mm ★ Length 3000 mm
5 <b>Guide sleeve</b>	4 <sup>1</sup> / <sub>2</sub> API Reg. - 3 <sup>1</sup> / <sub>2</sub> API Reg. effective length 317 mm wrench flats 120 mm
6 <b>DTH-hammer</b>	Thread 4 <sup>1</sup> / <sub>2</sub> API Reg.
7 <b>Casing shoe</b>	Surface hardened Not surface hardened
8 <b>Guide device - Foot valve - Locking kit</b>	Plastic See page 32-33
9 <b>Reamer</b>	★★ Reaming diameter 306 mm (12 <sup>4</sup> / <sub>8</sub> )
10 <b>Pilot bit</b>	★★ Diameter 240 mm (9 <sup>1</sup> / <sub>2</sub> )

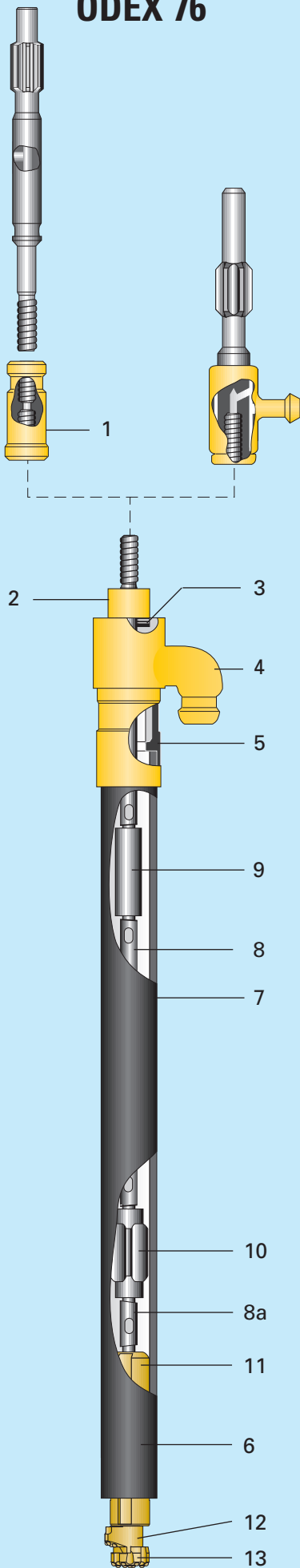
★ Below alternatives of drill pipes, are available as standard

Length (in mm)	Drill pipe Ø 114 Part Number
1000	8484 0141-90
1500	8484 0201-08
2000	8484 0141-91

★★ Buttons	No. x size mm	
	Gauge	Front
Reamer	5 x 16	1 x 16
Pilot bit	8 x 16	10 x 16

<b>Atlas Copco COP 84L</b>	<b>Atlas Copco COP 84HP</b>	<i>SECOROC 8" L</i>	<i>Ingersoll-Rand DHD 380</i>
Product No.	Product No.	Product No.	Product No.
8393 0813-77	8393 0813-77	8393 0813-77	8393 0813-77
to be obtained locally	to be obtained locally	to be obtained locally	to be obtained locally
8484 0144-41	8484 0144-41	8484 0144-41	8484 0144-41
8484 0201-09	8484 0201-09	8484 0201-09	8484 0201-09
8393 0812-11	8393 0812-11	8393 0812-11	8393 0812-11
8311 0905-92	8311 0905-93	–	–
8393 8182-22 8393 8182-21	8393 8182-22 8393 8182-21	8393 8182-22 8393 8182-21	8393 8182-22 8393 8182-21
8393 8607-03 0795 9217-00 0795 2011-06	8393 8607-04 0795 9224-00 0795 2011-06	8393 8607-03 0795 9217-00 0795 2011-06	8393 8607-04 0795 9224-00 0795 2011-06
8393 8607-02	8393 8607-02	8393 8607-02	8393 8607-02
8393 8607-01	8393 8607-01	8393 8607-01	8393 8607-01

# ODEX 76



# TOP HAMMER

## Type of hammer

Description	Specifications
<b>Shank adapter</b>	R38
<b>Flushing device</b> Packing (included, 2 pcs)	
<b>1 Driving sleeve</b>	For shank adapter with male thread Wrench flats 65 mm R38 - R38 T38 - R38 T45 - R38
<b>2 Spacer</b>	
<b>3 Cup spring</b>	3 pcs required
<b>4 Driving cap</b>	Complete, O.D. 145 mm Outlet bend, separate
<b>5 Adapter sleeve</b>	Wrench flats 110 mm
<b>6 Starting casing tube</b>	Length 250 mm
<b>7 Casing tube</b>	Threaded, <b>for ODEX 76T</b> R.H. thread, O.D. 88.9 mm Wall thickness 5.5 mm ★ Length 1220 mm
<b>7 Casing tube</b>	Threaded, <b>for ODEX 76W</b> O.D. max. 89 mm, I.D. min. 78 mm Wall thickness min. 4.5 mm
<b>8 Extension rod, R38</b>	★ Length 1220 mm (4)
<b>8a Extension rod</b>	Length 280 mm
<b>9 Coupling sleeve</b>	D = 55 mm, L = 170 mm
<b>10 Wing coupling</b>	D = 76 mm, L = 180 mm
<b>11 Guide device</b>	
<b>12 Reamer</b>	★★ Reaming diameter 96 mm (3 25/32)
<b>13 Pilot bit</b>	★★ Diameter 70 mm (2 3/4)

### Auxiliary tools

### Product Number

Wrench for pilot bit .....	8484 0211-42
Wrench for extension rods .....	0795 9063-00
Wrench for guide device.....	8484 0211-60
Grouting device .....	7989 1509-00

Further information on pages 30-31

<b>ODEX 76T</b>			<b>ODEX 76W</b>		
<b>Atlas Copco BBE 57-01</b>	<b>Atlas Copco COP 1238ME</b>	<b>Other types of top-hammer with male thread adapter</b>	<b>Atlas Copco BBE 57-01</b>	<b>Atlas Copco COP 1238ME</b>	<b>Other types of top-hammer with male thread adapter</b>
Product No.	Product No.	Product No	Product No	Product No	Product No
7804 7505-01	7804 3598-01	—	7804 7505-01	7804 3598-01	—
7801 0001-00	— 0795 1806-00	—	7801 0001-00	— 0795 1806-00	—
—	7989 1512-00	7989 1512-00	—	7989 1512-00	7989 1512-00
—	—	7989 1519-00	—	—	7989 1519-00
—	—	7989 1517-00	—	—	7989 1517-00
8484 0140-54	8484 0140-54	8484 0140-54	8484 0140-54	8484 0140-54	8484 0140-54
0384 3595-00	0384 3595-00	0384 3595-00	0384 3595-00	0384 3595-00	0384 3595-00
8484 0211-57 8484 0211-59	8484 0211-57 8484 0211-59	8484 0211-57 8484 0211-59	8484 0211-57 8484 0211-59	8484 0211-57 8484 0211-59	8484 0211-57 8484 0211-59
8484 0140-49	8484 0140-49	8484 0140-49	8484 0140-51	8484 0140-51	8484 0140-51
8393 8179-05	8393 8179-05	8393 8179-05	8393 8179-05	8393 8179-05	8393 8179-05
8393 8179-06	8393 8179-06	8393 8179-06	—	—	—
—	—	—	to be obtained locally	to be obtained locally	to be obtained locally
7854 4312-30	7854 4312-30	7854 4312-30	7854 4312-30	7854 4312-30	7854 4312-30
7854 4302-20	7854 4302-20	7854 4302-20	7854 4302-20	7854 4302-20	7854 4302-20
7994 3655-00	7994 3655-00	7994 3655-00	7994 3655-00	7994 3655-00	7994 3655-00
7994 3076-00	7994 3076-00	7994 3076-00	7994 3076-00	7994 3076-00	7994 3076-00
7989 4076-00	7989 4076-00	7989 4076-00	7989 4076-00	7989 4076-00	7989 4076-00
7588 5096-40	7588 5096-40	7588 5096-40	7588 5096-40	7588 5096-40	7588 5096-40
7588 4070-40	7588 4070-40	7588 4070-40	7588 4070-40	7588 4070-40	7588 4070-40

★ Other lengths of casings and extension rods, are available as standard.

**Length**  
in mm (in)  
1830 (6")  
2440 (8")  
3050 (10")

**Casing tube**  
Part No.  
8393 8179-48  
8393 8179-14  
8393 8179-22

**Extension rod**  
Part Number  
7854 4318-30  
7854 4324-30  
7854 4331-30

**Length**  
in mm (in)  
1830 (6")  
2440 (8")  
3050 (10")

**Extension rod**  
Part Number  
7854 4318-30  
7854 4324-30  
7854 4331-30

★ Buttons

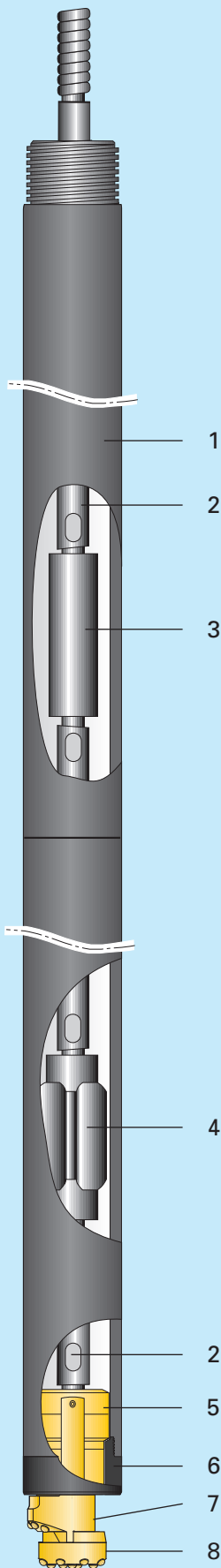
No. x size mm

Reamer  
Pilot bit

Gauge  
3 x 10  
6 x 12.7

Front  
—  
5 x 10

# ODEX 90/115



## TOP HAMMER

### Type of hammer

Description

1 **Casing tube**

2 **Extension rod**

2a **Extension rod**

3 **Coupling sleeve**

4 **Wing coupling**

5 **Guide device  
Locking kit**

6 **Casing shoe**

7 **Reamer**

8 **Pilot bit**

	<b>ODEX 90</b>			<b>ODEX 115</b>		
	Specifications	Product No.		Specifications	Product No	
	Threaded, for <b>ODEX 90</b> R.H. thread, O.D. 114.3 mm Wall thickness 6.3 mm Length 1220 mm Length 1530 mm	8393 8191-56 8393 8191-55		Threaded, for <b>ODEX 115</b> R.H. thread, O.D. 139.7 mm Wall thickness 6.3 mm Length 1220 mm Length 3050 mm	8393 0816-35 8393 0816-34	
	R32, R38, T38			T45, T51		
	R38 Length 280 mm	7854 4302-20		R51 Length 780 mm	8393 0816-18	
	R32, R38, T38			T45, T51		
	R38-R32 R38-R38 R38-T38	3744 9006-21 3744 9006-22 3744 9006-23		R51-T45 R51-T51	8393 0816-19 8393 0816-20	
		8393 8602-23 0795 2011-01			8393 0816-01 0795 2011-02	
	Surface hardened	8393 8191-42		Surface hardened	8393 8178-04	
	Reaming diameter 123 mm (4 <sup>27</sup> / <sub>32</sub> )	8393 8602-22		Reaming diameter 152 mm (6)	8393 0815-95	
	Diameter 90 mm (3 <sup>9</sup> / <sub>16</sub> )	8393 8602-21		Diameter 115 mm (4 <sup>1</sup> / <sub>2</sub> )	8393 0815-94	
	<b>Buttons</b>	<b>No. x size mm</b>		<b>Buttons</b>	<b>No. x size mm</b>	
		<b>Gauge</b>	<b>Front</b>		<b>Gauge</b>	<b>Front</b>
	Reamer	4x12.7	1x11	Reamer	4x14.5	1x12.7
	Pilot bit	8x11	5x11	Pilot bit	8x14.5	8x14.5

# Auxiliary tools

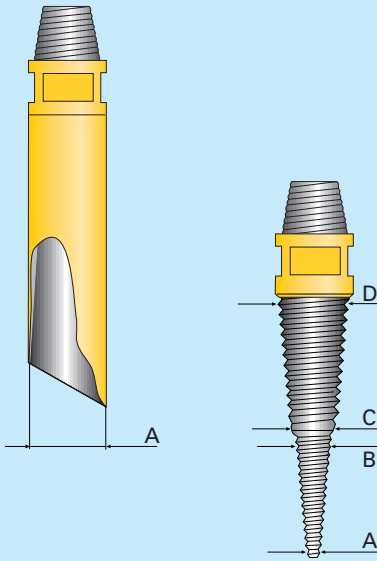
## Fishing tools

### Sleeves

API Reg pin	For catching	Part No.
2 3/8	4" DTH hammer	A = 89
2 3/8	76 mm pipe	A = 81.5
2 3/8	89 mm pipe	A = 94
3 1/2	6" DTH hammer	A = 138
3 1/2	114 mm pipe	A = 120

### Pikes

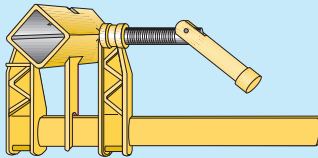
API Reg pin	For catching	Part No.
2 3/8	Drill pipes	A = 26 C = 75D = 91
3 1/2	Drill pipes	A = 34B = 60 C = 76D = 114



## Other ODEX tools

### Welding fixtures

	Part No.
ODEX 90-165 D = max. 225 T = 110	8484 0211-12
ODEX 190 D = max. 300 T = 140	8484 0211-13



## Wrenches

### For ODEX pilot bits and down-the-hole bits

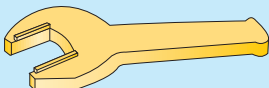
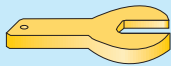
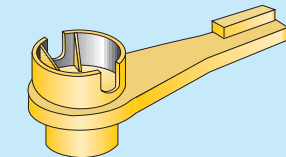
	Diameter	Part No.
ODEX 76	64 - 76	8484 0211-42
ODEX 76/90	76 - 90	8484 0211-14
ODEX 90	85 - 100	8484 0211-41
ODEX 115	105 - 115	8484 0211-17
ODEX 140	127 - 140	8484 0211-18
ODEX 165	150 - 165	8484 0211-05
ODEX 190	178 - 190	8484 0211-47

### For extension rods

R38 0795 9093-00

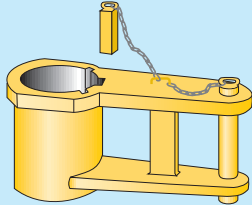
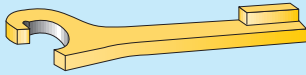
### For drill pipes and other equipment with flats

Wrench flats	Part No.
65	8484 0211-00
95	8484 0211-02
110	8484 0211-62
120	8484 0211-36
140	8484 0211-44



# Auxiliary tools

## Wrenches



### For ODEX guide devices

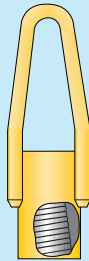
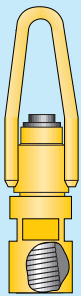
ODEX 76  
ODEX 90  
ODEX 115  
ODEX 140  
ODEX 165  
ODEX 190

### Part No.

8484 0211-60  
8484 0211-08  
8484 0211-06  
8484 0211-04  
8484 0211-07  
8484 0211-09

(see also illustration on page 33)

## Lifting tools



### Lifting plugs, swivelling

3 1/2 API Reg box

### Part No.

8484 0213-24

### Lifting plugs, fixed

2 3/8 API Reg box  
3 1/2 API Reg box  
3 1/2 API Reg pin

8484 0213-28  
8484 0213-32  
8484 0213-41

### Lifting slings for drill pipes

Drill pipe length	Drill pipe Ø
3000 mm	89
6000 mm	89
3000 mm	114
6000 mm	114

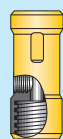
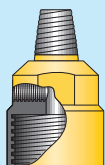
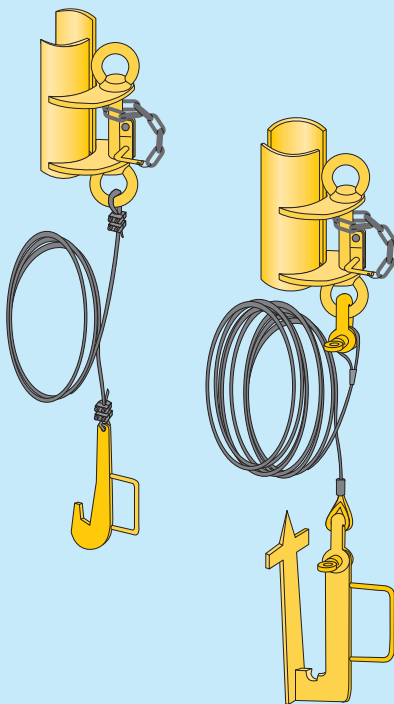
8484 0213-05  
8484 0213-13  
8484 0213-06  
8484 0213-14

### Lifting slings for ODEX equipment together with 3 m casing

ODEX 115  
ODEX 140  
ODEX 165  
ODEX 190

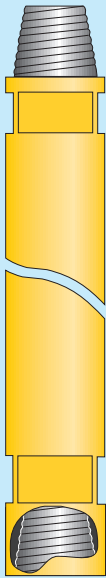
8484 0213-01  
8484 0213-02  
8484 0213-03  
8484 0213-09

## Grouting device (DTH)

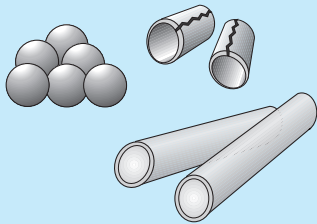


	Wrench flats	Hose connection	Part No.
<b>ODEX 76T-G2</b>	97 mm	R1"	7989 1509-00
<b>ODEX 90T-G2</b>	65 mm	R1"	8484 0140-45
<b>ODEX 115T-G2</b>	140 mm	R1"	8484 0140-24
<b>ODEX 140T-G2</b>	140 mm	R1"	8484 0140-46
<b>ODEX 165T-G2</b>	140 mm	R1"	8484 0140-68

## Start drill pipes



	Wall thickness	mm	L ft in	Ø mm	Part No.
2 3/8 API Reg	6.3 mm	2100	6' 11"	76	8484 0143-68
2 3/8 API Reg	6.3 mm	2000	6' 3/4"	76	8484 0143-18
2 3/8 API Reg	6.3 mm	2100	6' 11"	89	8484 0144-40
2 3/8 API Reg	6.3 mm	2000	6' 6 3/4"	89	8484 0141-71
2 3/8 API Reg	6.3 mm	1900	6' 2 3/4"	89	8484 0144-36
2 3/8 API Reg	6.3 mm	1800	5' 11"	89	8484 0144-37
2 3/8 API Reg	6.3 mm	1700	6' 7"	89	8484 0144-38
2 3/8 API Reg	6.3 mm	1600	5' 3"	89	8484 0144-47
3 1/2 API Reg	8.8 mm	1800	5' 11"	114	8484 0144-41
3 1/2 API Reg	8.8 mm	1700	5' 7"	114	8484 0144-42
3 1/2 API Reg	8.8 mm	1600	5' 3"	114	8484 0144-48



## Locking kit

Description	Dimensions	Qty.	Part No.
<b>ODEX 90T/W-G2</b>			
Locking kit compl.			0795 2011-01
-Bearing ball	Ø 9.5	6 (12)	0517 1116-00
-Spring pin	Ø 10x15	2 (4)	0795 2002-01
-Locking pin	Ø 10x50	2 (4)	0102 0419-00
<b>ODEX 115T/W-G2</b>			
Locking kit compl.			0795 2011-02
-Bearing ball	Ø 9.5	10 (18)	0517 1116-00
-Spring pin	Ø 10x15	2 (4)	0795 2002-01
-Locking pin	Ø 10x60	2 (2)	0102 0423-00
<b>ODEX 140T/W-G2</b>			
Locking kit compl.			0795 2011-03
-Bearing ball	Ø 11	12 (18)	0517 1166-00
-Spring pin	Ø 12x20	2 (4)	0795 2002-02
-Locking pin	Ø 12x70	2 (2)	0102 0476-00
<b>ODEX 165T/W-G2</b>			
Locking kit compl.			0795 2011-04
-Bearing ball	Ø 11	14 (21)	0517 1166-00
-Spring pin	Ø 12x20	2 (4)	0795 2002-02
-Locking pin	Ø 12x80	2 (2)	0102 0478-00
<b>ODEX 190W-G2</b>			
Locking kit compl.			0795 2011-05
-Bearing ball	Ø 13	14 (21)	0517 1100-16
-Spring pin	Ø 14x20	2 (4)	0795 2002-03
-Locking pin	Ø 14x100	2 (2)	0795 2001-05
<b>ODEX 240W-G2</b>			
Locking kit compl.			0795 2011-06
-Bearing ball	Ø 13	18 (27)	0517 1100-06
-Spring pin	Ø 14x20	2 (4)	0795 2002-03
-Locking pin	Ø 14x120	2 (2)	0795 2001-06

# ODEX G2

## Ball locking system

### Assembly

1. Coate the pilot pin thread with Atlas Copco thread grease.
2. Thread the pilot bit into the guide device by hand.
3. Insert a lock pin into one of the holes for the locking system (Fig. 1).

Make sure the lock pin is in bottom position of hole.

4. Hammer spring pin into position. Use suitable size of mandrel to prevent damages on guide device, when lock pin get near the edge of the guide device.
5. Seat the spring pin against the lock pin.
6. Load bearing balls into the hole without lock pin. Use the mandrel to guide the bearing balls into the groove (Fig. 2). Fill groove with no of bearing balls as shown on next page.
7. Load the last lock pin into hole (Fig. 3).
8. Hammer spring pin into position.
9. Before start to drill, tighten up the pilot thread by using a suitable pilot bit wrench.

### Dissassembly

1. Open up the pilot bit thread by using a suitable pilot bit wrench.
2. Remove all spring- and lock pins, by using a hammer and suitable mandrel (Fig. 4).
3. The bearing balls will then easily be guided out of the groove, by using a nylon strap or flexible steel wire (Fig. 5).
4. Unthread the pilot bit.
5. Free the reamer from the pilot bit.

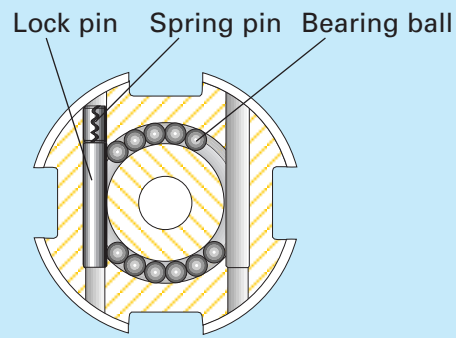


Fig. 1

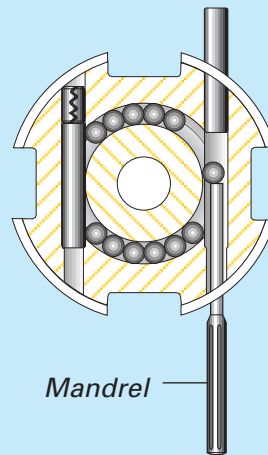


Fig. 2

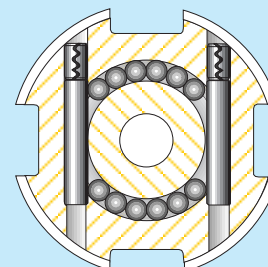


Fig. 3

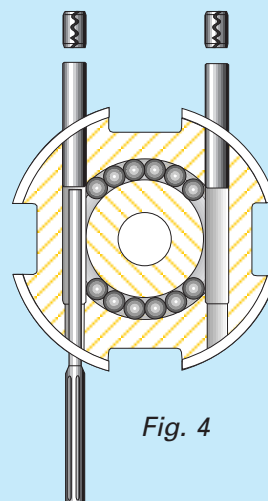


Fig. 4

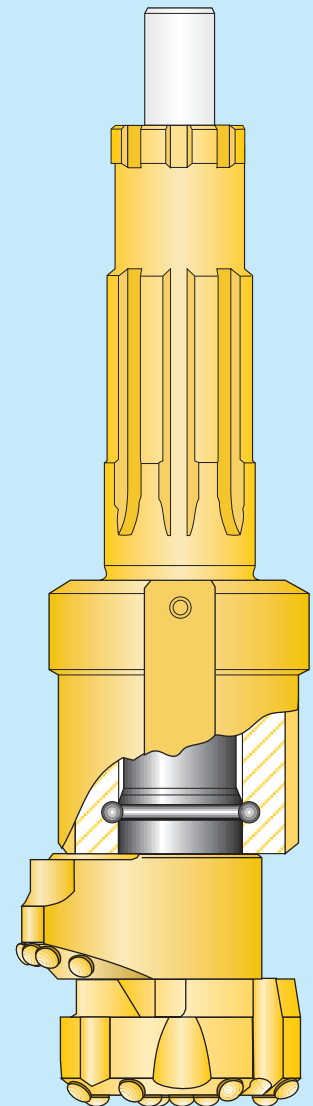
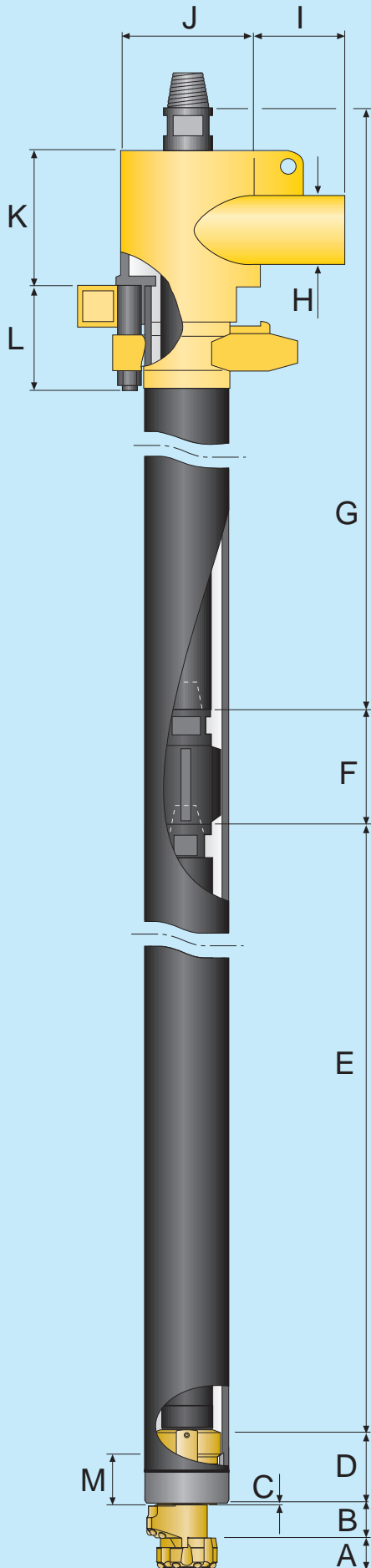


Fig. 5

## Dimensions ODEX 90-240



Ref.	Description	Dimensions in mm					
		ODEX 90	ODEX 115	ODEX 140	ODEX 165	ODEX 190	ODEX 240
A	Pilot Bit, length	53	61	72	78	84	86
B	Reamer, length	55	62	70	80	90	100
C	Guide device, protrusion	13	16	15	18	14	15
D	Guide device, length	125	140	155	170	190	190
E	DTH-hammer, length	-	-	-	-	-	317
F	Guide sleeve, length	225	225	**	250	***	****
G	Start drill pipe, see page 32	-	-	-	-	-	-
H	Discharge head, connection diameter	76	102	102	102	127	127
I	Discharge head, connection length	200	230	250	250	270	270
J	Discharge head, diameter	194	219	254	254	300	300
K	Discharge head, built-in length	155	180	180	205	205	205
L	Adapter sleeve* built-in length	105	110	110	110	-	-
M	Casing shoe, length	80	77	90	90	110	110

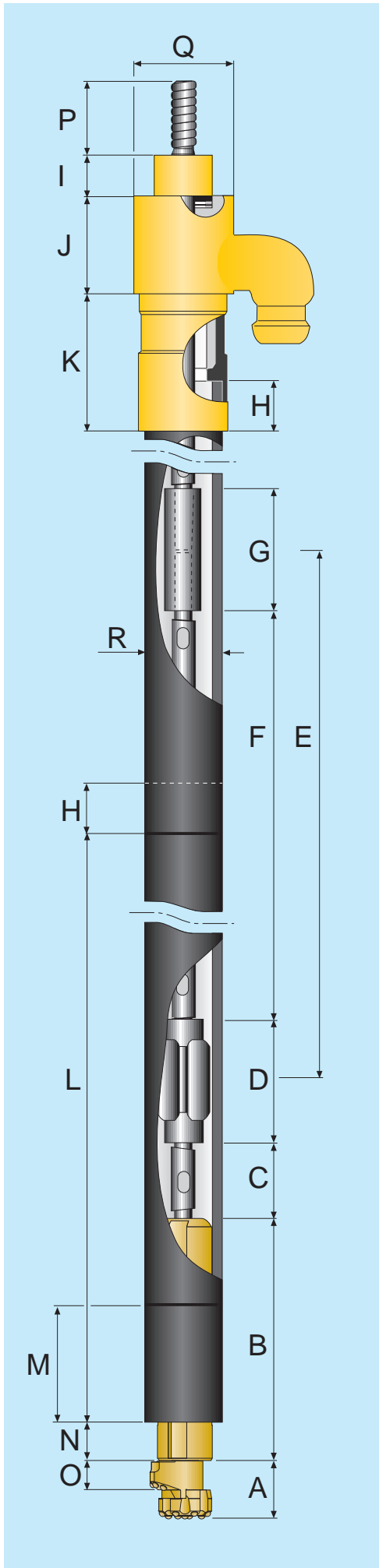
\*) Only threaded casing

\*\*) See page 18

\*\*\*) See page 22

\*\*\*\*) See page 24

## Dimensions ODEX 76



Ref.	Description	76 mm
A	Pilot Bit. protrusion,	106
B	Guide device, length	270
C	Rods, built-in length	110
D	With coupling, length	180
E	Extension rods, length	1220 1830 2435 3050
F	E - 160 mm	
G	Sleeve, length	170
H	Casing, thread length	62
I	Spacer	62
J	Driving cap, built-in length	120
K	Adapter sleeve, built-in length	185
L	Recommended built-in length, first casing tube (incl. start casing tube)	2475
M	Start casing tube	250
N	Guide drilling position, protrusion (= approx.)	85
O	Reamer, length	60
P	Extension rod, protrusion	85
Q	Driving cap, outer diameter	140
R	Casing, outer diameter, see page 5	

# Recommendations DTH Hammers

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## Torque requirement

Drill rigs must have sufficient torque for drilling with ODEX.  
This table shows minimum required torque for the various ODEX sizes.

ODEX	90	115	140	165	190	240
Minimum torque, Nm	900	2000	3000	4000	>5500	>5500

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## Rotation speed

Rotation speed depends on the size of the ODEX bit and also on the formation being drilled.  
The rotation speed may have to be varied as the formation changes. The table shows recommended rotation speeds for the various ODEX sizes.

ODEX	90	115	140	165	190	240
Speed, r/min	20-30	20-25	15-20	15-20	10-15	10-15

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## Drilling depths

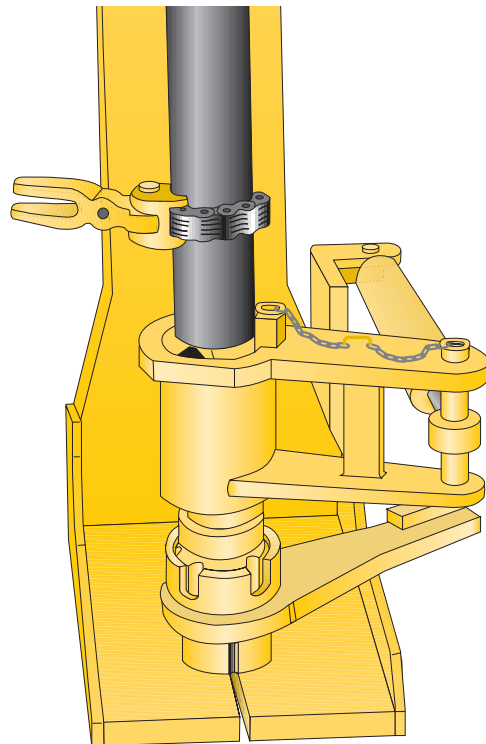
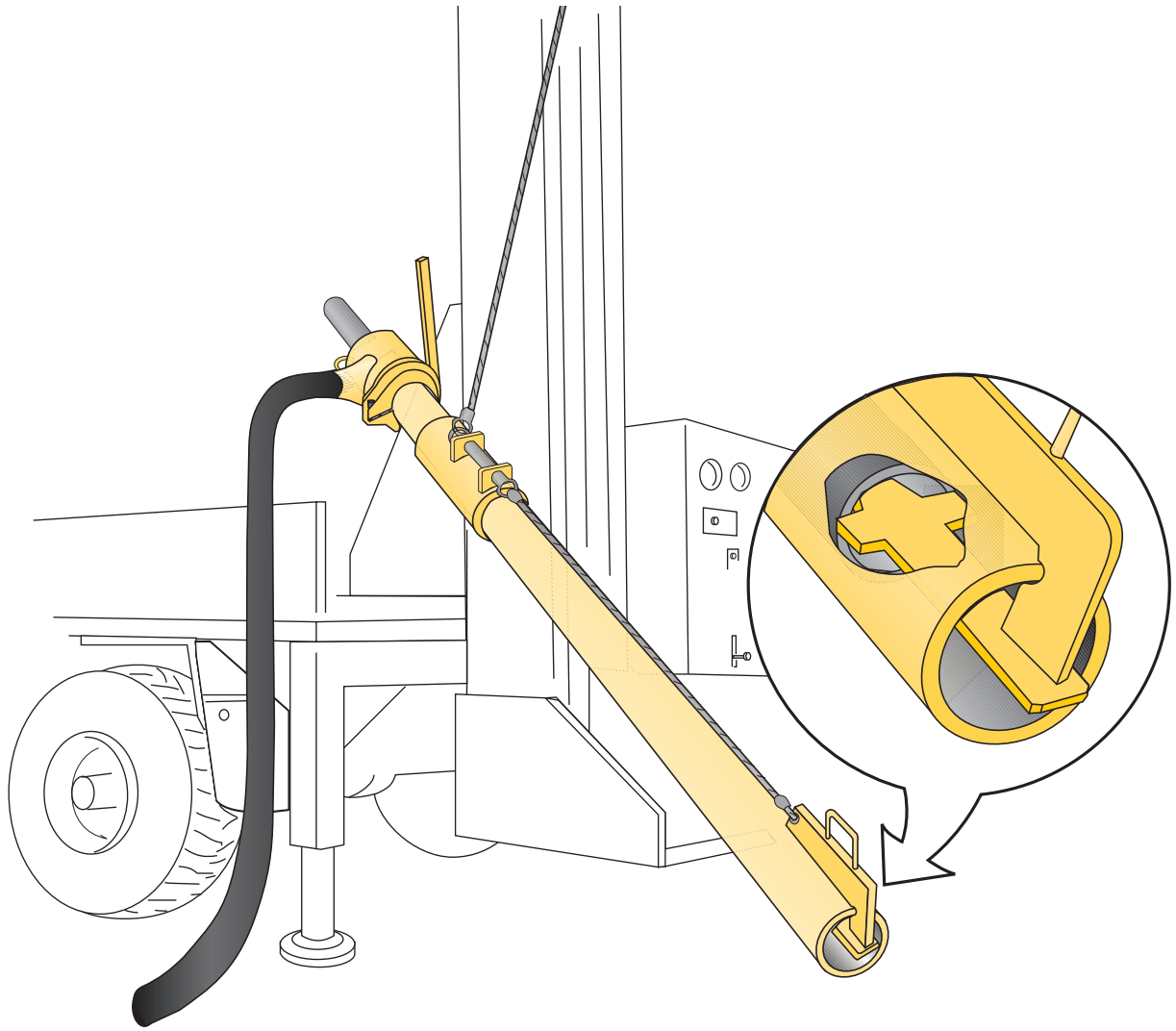
Obtained casing driving depth with ODEX depends on factors such as type of formation, available drilling equipment, and the drill crew's experience.  
Experience has shown that below and even deeper holes can be drilled with ODEX.

ODEX	90	115	140	165	190	240
Maximum hole depth in soil, (m)	60	100	100	100	100	100

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## Air pressure

Maximum recommended air pressure is 14 bar.



# Conversion factors

This unit	Times	Equals	This unit	Times	Equals
<b>Length</b>			<b>Mass (weight)</b>		
mm (millimetres)	x 0.001	= m	g (grammes)	x 0.001	= kg
cm (centimetres)	x 0.01	= m	t (tonnes, metric)	x 1000	= kg
dm (decimetres)	x 0.1	= m	grains	x 0.0648	= g
km (kilometres)	x 1000	= m	oz (ounce)	x 28.35	= g
in (inches)	x 25.4	= mm	lb (pounds)	x 0.4536	= kg
ft (feet)	x 0.305	= m	tons (long, US)	x 1016	= kg
yd (yard)	x 0.914	= m	tons (U.K.)	x 1016	= kg
miles	x 1609	= m	tons (short)	x 907	= kg
<b>Power</b>			<b>Speed</b>		
kW (kilowatts)	x 1000	= W	km/h (kilometres/hour)	x 0.2777	= m/s
Horsepower, metric	x 735.5	= W	m/s	x 3.6	= km/h
Horsepower, U.K.	x 745.7	= W	mph (miles/hour)	x 0.45	= m/s
ft.lbf/sec	x 1.36	= W	mph	x 1.61	= km/h
Btu/h	x 0.29	= W	ft/s (foot/second)	x 0.3048	= m/s
			ft/s /foot/second)	x 18.29	= ft/min
			ft/min (foot/minute)	x 0.3048	= m/min
<b>Volume</b>			<b>Frequency</b>		
l (litres)	x 0.001	= m <sup>3</sup>	blows/minute	x 0.017	= Hz
ml (millilitres)	x 0.001	= l	kHz (kiloHertz)	x 1000	= Hz
dm <sup>3</sup> (cubic decimetres)	x 1.0	= l	r/min (rev./minute)	x 0.01667	= r/s
cm <sup>3</sup> (cubic centimetres)	x 1.0	= ml	degrees/second	x 0.1667	= r/min
mm <sup>3</sup> (cubic millimetres)	x 0.001	= ml	radians/second	x 0.1592	= r/s
in <sup>3</sup> (cubic inches)	x 16.39	= ml			
ft <sup>3</sup> (cubic feet)	x 28.316	= l			
Imperial gallon	x 4.546	= l			
U.S. gallon	x 3.785	= l			
Ounces (Imp. fluid oz)	x 28.41	= ml			
Ounces (U.S. fluid oz)	x 29.57	= ml			
Pints (U.S. liq.)	x 0.4732	= l			
Quarts (U.S. liq)	x 0.9463	= l			
yd <sup>3</sup> (cubic yards)	x 0.7646	= m <sup>3</sup>			
<b>Force</b>			<b>Pressure</b>		
kN (kilonewton)	x 1000	= N	bar	x 100	= kPa
kp (kilopond)	x 9.81	= N	bar	x 100 000	= Pa
kgf (kilogramme force)	x 9.81	= N	kp/cm <sup>2</sup>	x 0.98	= bar
lbf (pound force)	x 4.45	= N	atm (atmospheres)	x 1.01	= bar
			psi (pounds/in <sup>2</sup> )	x 6.895	= kPa
			psi	x 0.06895	= bar
<b>Torque</b>			<b>Area</b>		
kpm (kilopondmetres)	x 9.81	= Nm	mm <sup>2</sup> (square mm)	x 0.000001	= m <sup>2</sup>
lbf in (poundforce/inch)	x 0.11	= Nm	cm <sup>2</sup> (square cm)	x 0.0001	= m <sup>2</sup>
lbf ft (poundforce/foot)	x 1.36	= Nm	in <sup>2</sup> (square inches)	x 645	= mm <sup>2</sup>
			ft <sup>2</sup> (square feet)	x 0.929	= m <sup>2</sup>
			yd <sup>2</sup> (square yards)	x 0.8361	= m <sup>2</sup>
			Acres	x 4047	= m <sup>2</sup>
			Square miles	x 2.590	= km <sup>2</sup>

# Weights and Cross Index

Product number	Weight kg	Page	Product number	Weight kg	Page	Product number	Weight kg	Page	Product number	Weight kg	Page
<b>102</b>			1512-00	5,3	27	8602-04	7	7,15	0141-71	30	9,17,32
0419-00	0,06	32	1517-00	5,3	27	8602-06	7	7,15	0141-90	27	10,12,18
0423-00	0,06	32	1519-00	5,3	27	8602-07	7	7,15			20,22,24
0476-00	0,08	32	4076-00	6,2	27	8602-21	3,6	29	0141-91	44	10,12,18
0478-00	0,1	32				8602-22	1,6	29			20,22,24
			<b>7994</b>			8602-23	10,2	29	0143-18	25	15,32
<b>384</b>			3076-00	2,6	27	8603-01	7,4	9,17	0143-68	21	7,15,32
3595-00	0,16	27	3655-00	1,7	27	8603-02	2,6	9,17	0144-36	29	9,17,32
						8603-03	12	9,17	0144-37	28	11,17,19,32
<b>517</b>			<b>8311</b>			8603-04	12	9,17	0144-38	27	11,19,32
1100-06	0,01	32	0903-21	23	7,15	8603-05	12	9,17	0144-40	31	9,13,19,32
1100-16	0,01	32	0905-14	27,1	7,9,15,17	8603-06	12	9,17	0144-41	49	13,23,25,32
1116-00	0,003	32	0905-50	38	9,11,17,19	8604-01	13	11,19	0144-42	48	13,21,23,32
1166-00	0,005	32	0905-60	57	11,19	8604-02	4,5	11,19	0144-47	25	19,32
			0905-70	57	11,13,19,21	8604-03	20,5	11,19	0144-48	44	21,32
			0905-80	95	13,21,23	8604-04	17	11,19	0201-01	15	6,8,14,16
<b>795</b>			0905-92	130	23,25	8604-05	20,5	11,19	0201-02	11	6,8,14,16
1806-00	0,02	27	0905-93	158	25	8604-06	20,5	11,13,19	0201-03	25	7,9,15,17
2001-05	0,1	32				8605-01	19,3	13,21	0201-04	18	8,10,16,18
2001-06	0,1	32	<b>8393</b>			8605-02	7	13,21	0201-05	31	9,11,17,19
2002-01	0,01	32	0812-11	25,5	25	8605-03	35	13,21	0201-08	35	10,12,18
2002-02	0,01	32	0813-77	28,5	25	8605-04	35	13,21			20,22,24
2002-03	0,03	32	0815-94	7,4	29	8605-05	35	13,21	0201-09	60	13,21,23,25
2005-01	0,1	7,15	0815-95	2,6	29	8605-06	32,5	13,21	0201-91	18	6,8,10,14,16
2005-02	0,1	7,15	0816-01	11	29	8606-01	27,5	23	0201-92	23	8,10,16,18
2011-01	0,1	7,15,32	0816-18		29	8606-02	10	23	0210-93	14	30
2011-02	0,1	9,17,32	0816-19		29	8606-03	45,5	23	0210-94	21	30
2011-03	0,3	11,19,32	0816-20		29	8606-04	45,5	23	0210-95	12	30
2011-04	0,3	13,21,32	0816-34	63	29	8606-05	45,5	23	0210-96	10	30
2011-05	0,5	23,32	0816-35	21	29	8607-01	50,5	25	0210-97	4,5	30
2011-06	0,6	25, 32	8178-03	1,5	17	8607-02	18	25	0210-98	18	30
9063-00	6,2	26	8178-04	1,5	8,9,17,29	8607-03	68	25	0210-99	28	30
9214-00	0,02	9,17	8178-07	29	8	8607-04	68	25	0211-00	5,5	7,9,11,15,17
9215-00	0,03	11,19	8178-15	61	9	<b>8484</b>			0211-02	8	11,13,19
9216-00	0,025	13,21,23	8178-49	40,6	8	0140-22	0,2	9, 17			21,23,30
9217-00	0,03	23, 25	8178-56	20,3	8	0140-23	2,7	9	0211-04	14,5	11,16,19,31
9224-00	0,03	25	8178-75	60	9	0140-24	12	9, 31	0211-05	20	13,21,26,30
9235-00	0,07	13,21,23	8179-05	2,8	27	0140-29	0,3	9, 17	0211-06	15	9,17,31
9236-00	0,05	11,13,19,21	8179-06	14	27	0140-30	0,3	7, 15	0211-07	21	13,21,31
9237-00	0,01	9,11,17,19	8179-14	28	27	0140-31	0,5	11, 19	0211-08	12	7,15,31
9279-00	0,01	7,9,15,17	8179-22	36	27	0140-32	0,5	11	0211-09	22,5	23,31
			8179-48	21	27	0140-33	0,5	13,21	0211-12	4	30
<b>3744</b>			8179-53	3,2	21	0140-34	0,9	23	0211-13	5	30
9006-21	3,1	29	8179-54	3,2	12,13,21	0140-37	3,6	11	0211-14	13	7,15,30
9006-22	3,1	29	8179-55	29	12	0140-38	2,3	7	0211-17	14,5	9,17,30
9006-23	3,1	29	8179-63	43,5	12	0140-39	4,1	13	0211-18	18	11,19,30
			8179-71	58	12	0140-40	9	7,15	0211-27	15	7,15
<b>7588</b>			8179-89	87	13	0140-41	17,5	11,19	0211-29	14,5	9,17
4070-40	3	27	8179-99	85	13	0140-42	22	23	0211-31	18	11,19
5096-40	1	27	8180-29	25	10	0140-45	10,5	7,31	0211-33	20	13,21
			8180-37	38	10	0140-46	14	11,31	0211-36	10,5	30
			8180-45	50	10	0140-49	6,7	27	0211-41	13	30
			8180-52	75	11	0140-51	6,2	27	0211-42	13	26,30
<b>7801</b>			8180-88	79	11	0140-54	2	27	0211-44	14	9,11,13,30
0001-00	2,2	27	8180-93	2,4	19	0140-55	2,0	23	0211-45	23	23
			8180-94	2,4	10,11,19	0140-56	2,0	23	0211-47		23,30
<b>7804</b>			8182-01	4,1	23	0140-57	0,2	23	0211-57	15	27
3598-01	4,5	27	8182-02	4,1	23	0140-58	3,0	7,9,11,13	0211-59	0,5	27
7505-01	6,8	27	8182-21	7,2	25			15,17,19	0211-60	2,5	26,31
			8182-22	7,2	25	0140-59	1,0	7,15	0211-62	10	30
			8191-01	17	6	0140-61	8,1	7,15	0213-01	11,5	31
<b>7854</b>			8191-11	25,5	6	0140-62	1,5	9,17	0213-02	13,5	31
4302-20	2	27,29	8191-21	34	6	0140-64	0,2	9,11,13	0213-03	16	31
4312-30	10	27	8191-31	51	7			17,19,21	0213-05	9	31
4318-30	14,5	27	8191-41	1,1	15	0140-65	1,0	11,19	0213-06	9,5	31
4324-30	17,8	27	8191-42	1,1	6,7,15,29	0140-66		13,21	0213-09	23	31
4331-30	25	27	8191-54	52	7	0140-68	17	13,31	0213-13	10	31
			8191-55	25,5	29	0141-43	11,5	9,17	0213-14	10,5	31
			8191-56	20,0	29	0141-44	13	11,19	0213-24	12,5	31
<b>7989</b>			8602-01	3,6	7,15	0141-49	6,7	11,19	0213-28	5,5	31
1509-00	10,5	26,31	8602-02	1,5	7,15	0141-50	20,5	13,21	0213-32	9	31
			8602-03	7	7,15	0141-55	14	8,10,16,18	0213-41	9,5	31

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