Touching water or heat in one go

COP W4 2.0
Geothermal and water-well hammer and drill-bit package

Epiroc

Touching water or heat in one go

Mount the gear, drill the hole and on to next. Fast and smooth, without hassle. One hole in one go, without jamming or premature bit failure. That's most drillers' idea of a good day at work.

ROP and reliability

Geothermal and water-well drilling are all about speed and durability. The hammer must operate with a high rate of penetration (ROP), while being robust enough for you to drill all the way down to the required depth without interruption. Because, at the end of the day, it's how many holes you've drilled that matters.

Understanding your challenges

We listened to several geothermal professionals describing their challenges. As a result, the upgraded COP W4 2.0 hammer is powerful enough to efficiently penetrate even very deep or water-filled holes, and its bit durable enough to last up to 400 meters in one go. Because we know how important it is for anyone working with geothermal or water-well drilling.

More than a facelift

We increased the airflow of the hammer to maximize its impact energy. We redesigned the bit to cope with the increased impact energy. We strengthened the steel of the casing to extend the hammer's lifetime. Just to name of few improvements. The upgraded hammer lends its name, COP W4 2.0, to the software world. Just to emphasize that it's more than a facelift – it's a new way of working.

DREAM PACKAGE

We pay equal attention to every part of your equipment. Hammer and bit are developed side by side and optimized as a package – from idea to complete solution. That's why you can put your trust in COP W4 2.0.

Hammer

We went back to the drawing board when upgrading the existing COP W4. The result? The new **COP W4 2.0 HF,** with an airflow of 540 liters/s at 35 bar working pressure – and the power to penetrate deep and water-filled holes. If you're opting for compressor with lower volume of air, the standard 465 liters/s version comes upgraded as **COP W4 2.0 LF**, with the same 20 percent increase in wear resistance as the high-flow version.

DTH bit

Our new down-the-hole (DTH) bits are completely redesigned to maximize ROP and durability. The bit's body is made of a harder and tougher grade of steel. A special heat treatment enhances the bit's wear resistance and lifetime. The buttons – including innovative Trubbnos – are Enduro Extra treated to further extend the intervals between re-grinds.

E-kit

The internal parts of the hammer last longer than those in contact with the rock. The faster-wearing external parts can be easily replaced. With our economy kit, or E-kit, your COP W4 2.0 hammer can be rebuilt 1–3 times, with little or no loss in productivity. A clever way to cost-effectively sustain the productivity of your hammers.

Mission accomplished

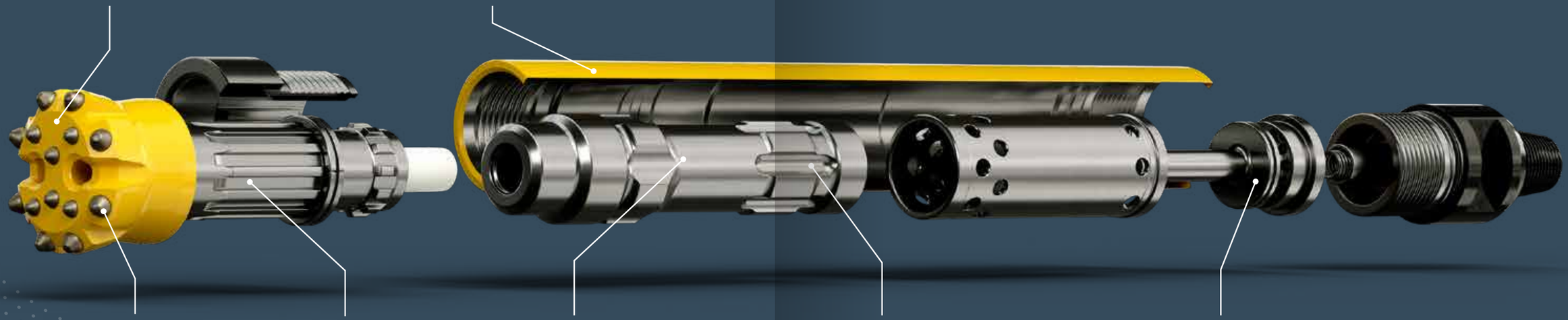
During testing, we achieved high ROP even at a water influx of 30,000 liters per hour. Productivity of at least 45 meters per hour at 35 bar working pressure. Total life of 12,000 meters including the use of two E-kits. All at a greatly reduced cost of drilling. Here's how we accomplished the mission.

Optimized bit head

The bit head is designed for superior drilling productivity, with ideal buttons and an optimized layout of flushing holes. Selectable bit face and button designs available depending on rock type (see also page 7).

Tougher steel

The hammer casing is made of proven high-class steel, which offers outstanding toughness and wear resistance. Tests show that the casing's lifetime has been increased by up to 20 percent compared to the previous version.



Stronger buttons

The buttons have undergone our patented Enduro Extra treatment, which improves their durability and increases the intervals between re-grinds by up to 20 percent.

Clever shank design

In-house metallurgy and heat treatment ensure optimum impact of energy transmission from the piston – and unbeatable drilling performance.

Smarter piston

The relation between the piston's and the bit's cross-section areas determines the stress level in the bit. We adjusted the relation as well as the shape of the piston to minimize bit stress.

Lighter piston

The new piston weighs only 7.35 kg, allowing for a higher strike frequency with less strain and wear on the hammer. It also enables more stable drilling, reducing the need for drilling-speed adjustments.

Novel air distributor

The new air distributor determines the air flow of the hammer, and is the only component that differs between COP W4 2.0 LF and COP W4 2.0 HF.

Technical data

DIMENSIONS AND WEIGHTS	Metric	Imperial
Length without drill bit	960.3 mm	37.8"
Length excl. thread	884.1 mm	34.8"
Outside diameter	101.6 mm	4"
Piston diameter	82 mm	3.22"
Top sub thread (standard) API Reg	60 mm	2⅜"
Wrench flat on top sub	65 mm	2½"
Weight without drill bit	37.8 kg	83.3 lbs
Piston weight	7.35 kg	16.2 lbs

DRILLING PARAMETERS	
Working pressure max.	35 bar / 507 psi

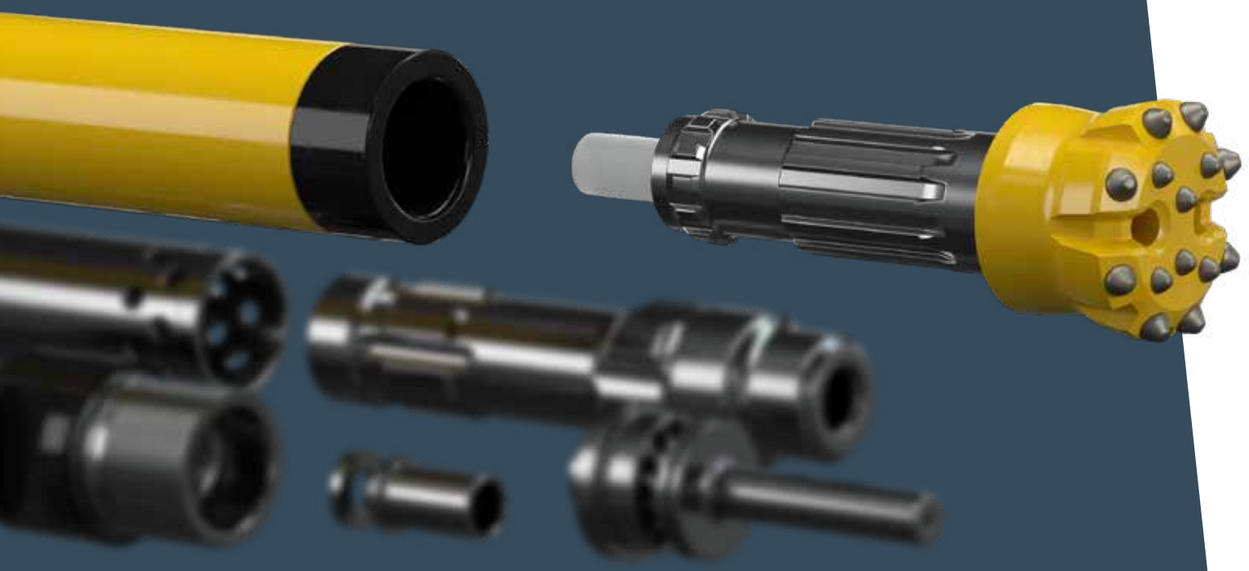
RECOMMENDED WOB AND RPM*	WOB (N)	RPM
20 bar (290 psi)	10500	92 ± 10%
25 bar (362 psi)	12700	92 ± 10%
30 bar (435 psi)	14500	102 ± 10%
35 bar (507 psi)	16000	110 ± 10%

** for 115 mm diameter bit*

	Strokes/min		L/s	
IMPACT RATE AND AIR CONSUMPTION	HF	LF	HF	LF
20 bar (290 psi)	1950	1992	266	233
25 bar (362 psi)	2136	2172	350	309
30 bar (435 psi)	2322	2334	432	383
35 bar (507 psi)	2520	2550	540	465

Field tests

"Drillers simply want no other hammer"



For a full year, the new COP W4 2.0 HF hammer was tested by selected drilling contractors for water-well and geothermal drilling. Most of them reported that the newer version of hammer had become more reliable, easy to adjust and cost saving.

Averaging 60 meters per hour

With a large compressor and 35 bar working pressure, it drilled 60 meters per hour on average, using 1.9–2.0 liters of diesel per meter. With a smaller compressor, at 25 bar pressure, 40–45 meters per hour were drilled with a diesel consumption of 1.5–1.6 liters per meter – a reduction of 0.8–1.0 liters per three-meter rod compared to the reference equipment.

Fuel costs in focus

Almost all geothermal contractors said they prioritize reducing diesel consumption over meters drilled per hour, as their fuel costs were reportedly higher than their drillers' salary costs. They were therefore very pleased with the vastly improved energy efficiency of the newer hammer.

Overall experiences can be summarized as: "Drillers simply want no other hammer", as they reported the hammer is energy efficient, robust, easy to adjust to the rock type and requires little monitoring.

Assortments

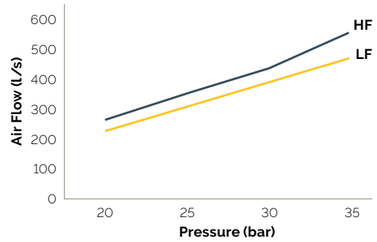
Hammer assembly

Description	Product no	Product code
COP W4 2.0 HIGH FLOW HAMMER 2-3/8 REG, PIN	5697000549	9704-WW-FE-10P-64-000
COP W4 2.0 HIGH FLOW HAMMER 2-7/8 REG, PIN	5697001127	9704-WW-FE-12P-64-000
COP W4 2.0 LOW FLOW HAMMER 2-3/8 REG, PIN	5697000550	9704-WW-LE-10P-64-000

E-kits

Description	Product no	Product code
COP W4 2.0 E-KIT API 2-3/8" REG, Pin	5697000911	9704-WW-00-10P-64-000-K40
COP W4 2.0 E-KIT API 2-7/8" REG, Pin	5697001133	9704-WW-00-12P-64-000-K40

Air consumption



Drill bits (with TD 40 shank)

Diameter mm	Diameter inch	Product no	Product code	No of buttons × button diameter, mm (inch) Outer	Front	Cone	Gauge button angle Outer	Cone
FLAT FRONT								
110	4 5/16	90516005	100-5110-64-1210,10-20	8x14,5 (9/16)	7x12,7 (1/2)		35°	
115	4 1/2	90516006	100-5115-64-1210,10-20	8x14,5 (9/16)	7x12,7 (1/2)		35°	
* 115	4 1/2	90516450	100-5115-64-1228,10-20	8x15,8 (5/8)	6x12,7 (1/2)		35°	
120	4 3/4	90516506	100-5120-64-1210,10-20	8x14,5 (9/16)	8x12,7 (1/2)		35°	
125	4 5/16	90516227	100-5125-64-1210,10-20	8x14,5 (9/16)	10x12,7 (1/2)		35°	
130	5 1/8	90516007	100-5130-64-1218,10-20	8x15,8 (5/8)	8x14,5 (9/16)		35°	
140	5 1/2	90516447	100-5140-64-1218,10-20	8x15,8 (5/8)	10x14,5 (9/16)		35°	
152	6	90516446	100-5152-64-1217,10-20	8x15,8 (5/8)	8x15,8 (5/8)		35°	
CONCAVE								
115	4 1/2	90003644	100-5115-64-0210,10-20	8x14,5 (9/16)	4x12,7 (1/2)	2x12,7 (1/2)	35°	-20°
115	4 1/2	90029164	100-5115-64-0227,10-20	8x15,8 (5/8)	4x15,8 (5/8)	3x15,8 (5/8)	35°	-20°
130	5 1/8	90029022	100-5130-64-0218,10-20	8x15,8 (5/8)	4x14,5 (9/16)	3x14,5 (9/16)	35°	-20°

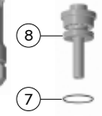
FOOT VALVE	90516004	9115
ASSEMBLY TOOL	90516013	9141

Bit faces

Flat face

Hard and abrasive formations, allround.

Spherical buttons



Speed bit *
For faster penetration

Concave face

From soft to hard formations. Less abrasive, fractured formations. Excellent control over hole deviation.

Spherical buttons
For hard and abrasive formations

Semi-ballistic buttons
For soft formations

Hammer parts

No	Description	Product no	Product code
1	Chuck	89012214	9704-00-WW-000-64-000-001
2	O-ring for bit retaining ring	-	(part of O-ring kit 89012219)
3	Bit Retaining Ring	86008906	9704-00-WW-000-64-000-002
3	Bit Retaining Ring Assembly	89012206	9704-00-WW-000-64-000-A02
4	Casing	5697000547	9704-WW-00-000-00-000-004
5	Piston	5697000546	9704-WW-00-000-64-000-005
6	Inner cylinder	5697000548	9704-WW-00-000-00-000-048
7	O-ring for air distributor	-	(part of O-ring kit 89012219)
8	Air Distributor High Flow	5660000269	9704-WW-FE-000-00-000-042
8	Air Distributor Assembly High Flow	5697000479	9704-WW-FE-000-00-000-A42
8	Air Distributor Low Flow	5660000270	9704-WW-LE-000-00-000-042
8	Air Distributor Assembly Low Flow	5697000478	9704-WW-LE-000-00-000-A42
9	Spring Check valve	89012216	9704-00-WW-000-00-000-016
10	Check valve	89001020	9704-CO-00-000-00-000-017
11	Valve seal	89001021	9704-CO-00-000-00-000-018
12	O-ring for backhead assembly	-	(part of O-ring kit 89012219)
13	Backhead API 2-3/8" Reg Pin	86008907	9704-00-WW-10P-00-000-020
13	Backhead API 2-3/8" Reg Pin Assembly	89012211	9704-00-WW-10P-00-000-A20
13	Backhead API 2-7/8" Reg Pin	86009091	9704-00-WW-12P-00-000-020
13	Backhead API 2-7/8" Reg Pin Assembly	89012477	9704-00-WW-12P-00-000-A20
	O-ring kit (no 2,7 and 12)	89012219	9704-00-WW-000-00-000-K47

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Performance unites us, innovation inspires us, and commitment drives us to keep moving forward. Count on Epiroc to deliver the solutions you need to succeed today and the technology to lead tomorrow.

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