

WATER HAMMER DRILLING SYSTEM



- NEW CONCEPT!!***
- NEW WATER HAMMER!!***
- POWERFUL & DEEP HOLE DRILLING!!***
- DRILLING RECORD***

Stockholm, Sweden - Jet Grouting Site - 2008

Liverpool, UK - Geothermal Drilling - 2009

London, UK - Geothermal Drilling - 2009

Korea, Geothermal 6", Hard Granite 430m - 2012

Korea, Geothermal 8", Hard Granite 2505m - 2012

Korea, Geothermal 8", Hard Granite 3505m - 2013

Korea, Geothermal 8.5", Hard Granite 2002m - 2018

Korea, Geothermal 12.25", Hard Granite 2002m - 2020

Finland, Geothermal 12.25", Hard Granite 2200m - 2021

Japan, Geothermal 17.5", Volcanic rock 1300m(target) - 2023



HANJIN D&B
Drilling Equipments Co., Ltd.
www.hanjindnb.com

WHAT IS THE WATER HAMMER?

► Water Hammer Drilling Process

01

Water Hammer Insertion

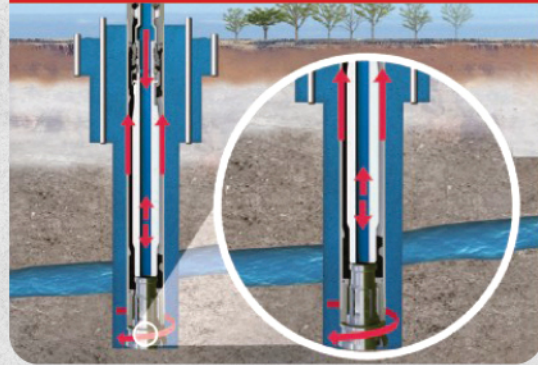


Rig operation/water hammer connected & water pump running



02

Water Hammer Drilling & Head rotation

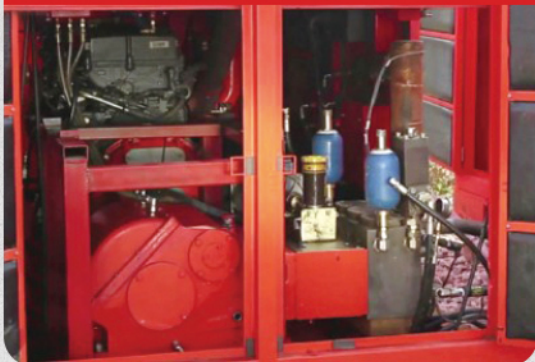


Drilling start. Hammer bit hitting by reciprocating motion with up and down between valve and piston



06

Water Pump



Water supply to drill by high pressure water pump

03

Separating System



1st cleaning by desander with rock fragments and soil materials on the surface



05

Water Tank



Inflowing clean water by purifier system into water tank

04

Purification System

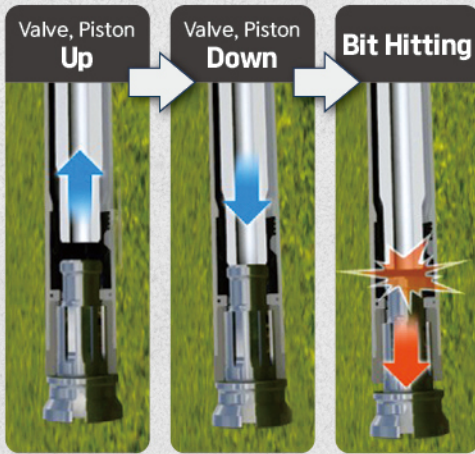


2nd cleaning by purification system for suspended solid and particles



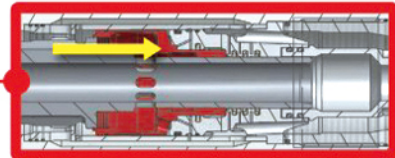
BASIC UNDERSTANDING POWER DRIVEN HAMMER

▶ Water Hammer

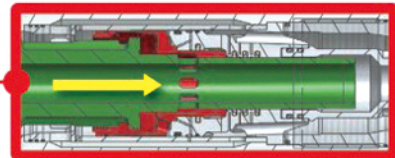
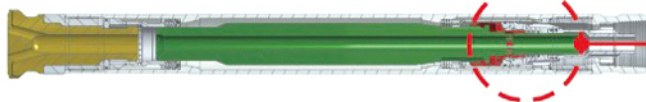


1. Valve-Position Up : Going up·Water hammer, Cleaning Drill Cuttings after 1 Cycle of Drilling
2. Valve-Position Down : Going down·Valve by difference of water pressure on the top of hammer part
3. Bit Hitting Speed : 10 ~ 15 times/sec

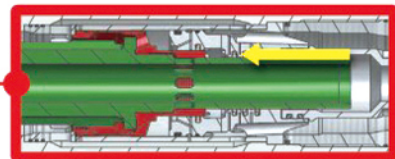
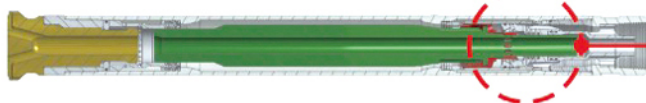
1. Going up valve by difference of water pressure : Going up valve by pressure rise – on the lower part



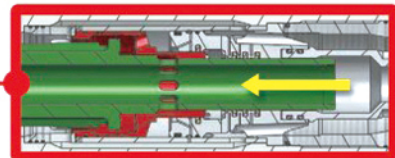
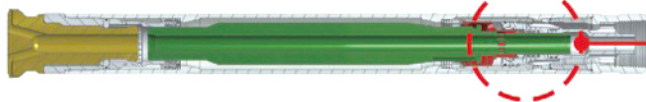
2. Going up piston by pressure rise – on the lower part



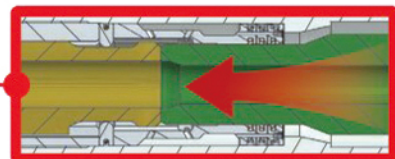
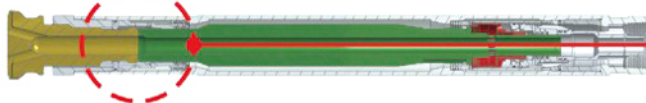
3. Going down valve by pressure rise – on the upper part



4. Going down piston by difference of pressure on the upper part

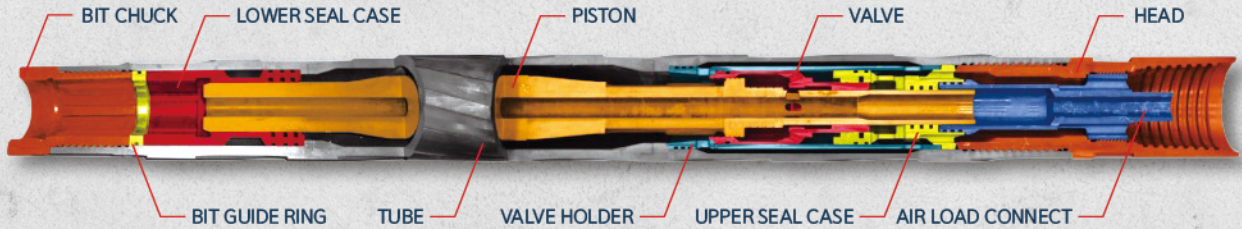


5. Hammer bit hitting



WATER HAMMER CONFIGURATION

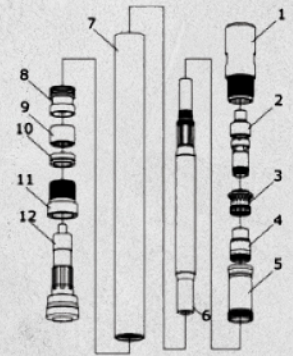
▶ Sectional View



▶ Water Hammer



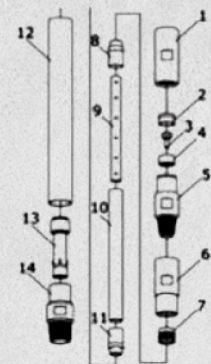
No.	DESCRIPTION
1	Connection Sub
2	Cut-off block
3	Upper seal case
4	Valve
5	Valve Guide
6	Piston
7	Tube
8	Lower seal case
9	Bit Guide ring
10	Bit Guide ring A
11	Bit Guide Chuck
12	Hammer Bit



▶ Accumulator



No.	DESCRIPTION
1	Rod adaptor
2	Valve seal
3	Valve
4	Valve housing
5	Air Rod coupling
6	Rod adaptor
7	Air seal case
8	Hose coupling
9	Hose inner tube
10	Rubber hose
11	Hose coupling
12	Air tube
13	Air Rod adaptor
14	Head

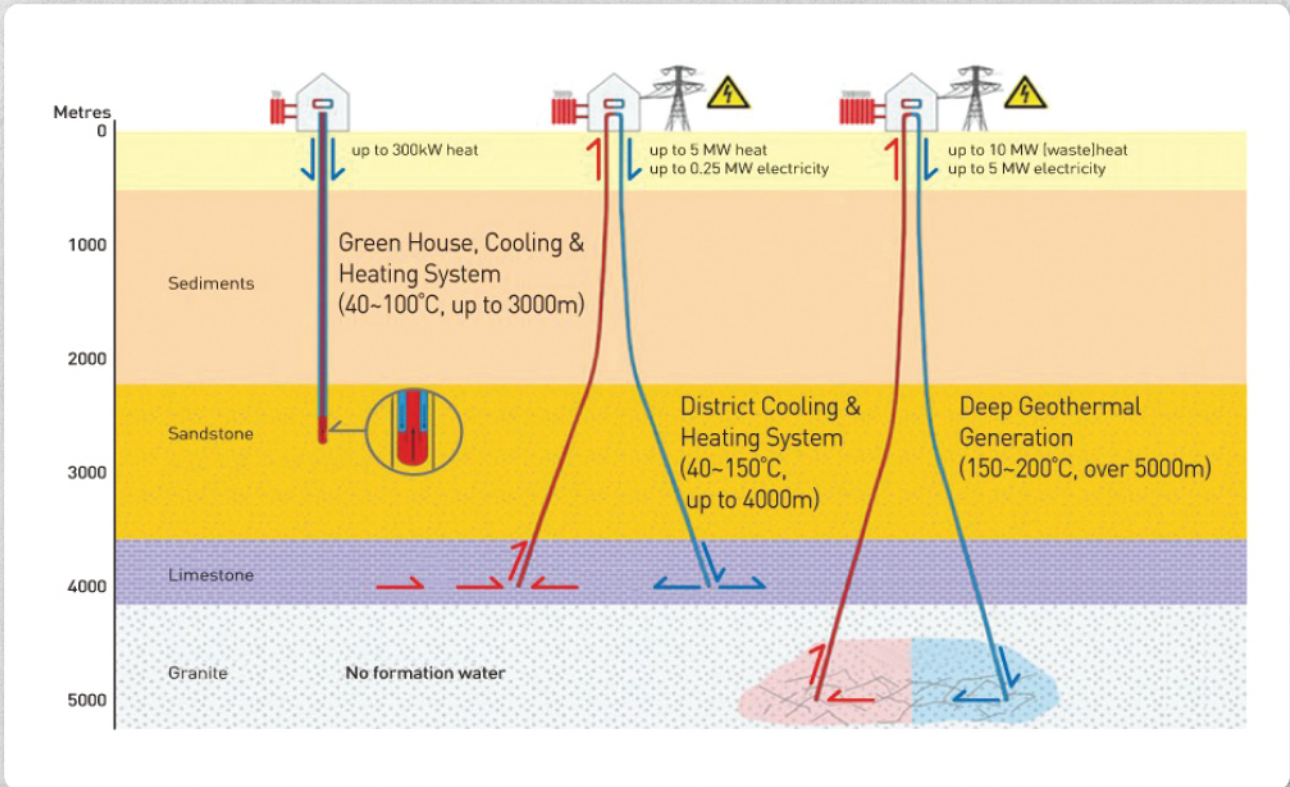


▶ Assembling process

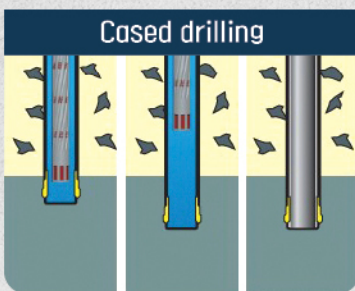


WHERE TO USE

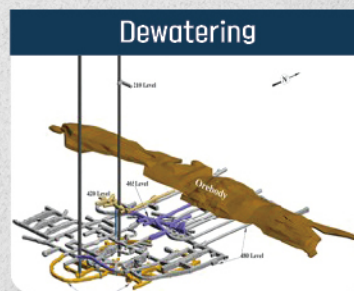
► Drilling System Application



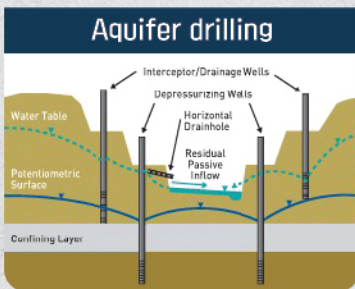
► Dewatering



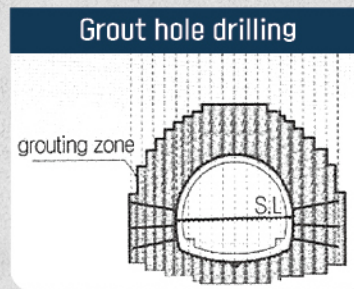
- Soft ground, Boulder in embankment, gravel and sand layer
- Construction area where low level of sound and vibration are required



- Tunnel, Slope Dewatering
- Accurate Deep Drilling using excellent linearity



- Drilling through confined aquifer



- Cement grouting for soft ground
- Dam, Embankment, Tunnel

D&B WATER HAMMER SPECIFICATION FOR DRILLING (0~750M)

Model	Hole Size (mm)	Operating Pressure (bar)	Water Consumption (lit/min)	BPM	Impact Energy (kg-m)	HP
D&B-30WH	76~102	120~210	160	2,000~2,670	10~15	5~8
D&B-40WH	102~125	100~140	238	2,000~2,610	25~34	22
D&B-50WH	127~140	85~115	350	1,700~2,140	30~51	25
D&B-60WH	150~165	75~110	575	1,700~2,240	66~76	35
D&B-80WH	202~250	75~110	1,030	1,700~2,219	125~145	68.5
D&B-100WH	252~300	75~100	1,450	1,700~2,150	180~225	105
D&B-120WH	300~350	75~100	1,430	1,700~1,900	230~290	110
D&B-160WH	400~500	75~120	4,500	1,300~1,700	350~475	175
D&B-160WH(R/C)	400~450	75~110	750~1,100	1,300~1,800	300~425	155
D&B-240WH(R/C)	609~850	75~110	1,000~1,450	1,300~1,600	500~850	233

1. Rate of Penetration : 0.4 ~ 1m/min

2. Over 1km : Add Water Pump and Compressor

3. Maximum Drilling Depth : 10km

· The information in the table is intended to provide general information about water hammer.

· If you provide us with various information such as final hole size and depth(well plan), we will provide optimal water hammer drilling conditions.

D&B WATER HAMMER SPECIFICATION FOR PILING

Model	Hole Size (mm)	Operating Pressure (bar)	Water Consumption (lit/min)	BPM	Impact Energy (kg-m)	HP
D&B-120WH	300~350	75~100	940	1,700~1,900	230~290	110
D&B-160WH(R/C)	400~450	75~110	1,450	1,300~1,800	300~425	155
D&B-240WH(R/C)	609~850	75~110	1,720	1,300~1,600	500~850	233

D&B WATER PUMP SPECIFICATION FOR DRILLING

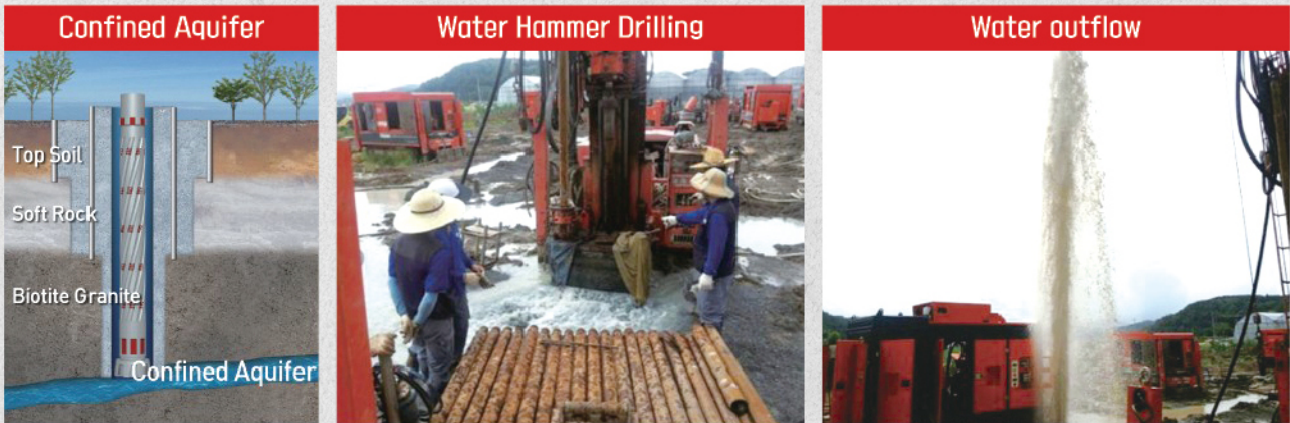
Model	Hole Size (inch)	Water Volume (lit/min)	Water Pressure (bar)	Air Volume (m ³)	HP	Drilling Depth (m)
D&B-240WP	3~4	240	240	2.2	160	0~750
D&B-580WHP	5~6	580	220	4	315	0~750
D&B-850WP	6~8	850	150	5	420	0~750
D&B-1450WP	10	1,450	160	7.5	550	0~750
D&B-1945WP	12	1,945	155	7.5	750	0~750
D&B-1945WP(II)	16	1,945 × 2	155	7.5 × 2	750 × 2	0~750

D&B WATER PUMP SPECIFICATION FOR PILING

Model	Hole Size (inch)	Water Volume (lit/min)	Water Pressure (bar)	Air Volume (m ³)	HP	Pile Diameter (mm)
D&B-940WPP	12	940	135	6.3	420	350~500
D&B-1450WPP(R/C)	16	1,450	165	7.5	550	450~850
D&B-1720WPP(R/C)	24	1,720	175	7.5	750	650~1,200

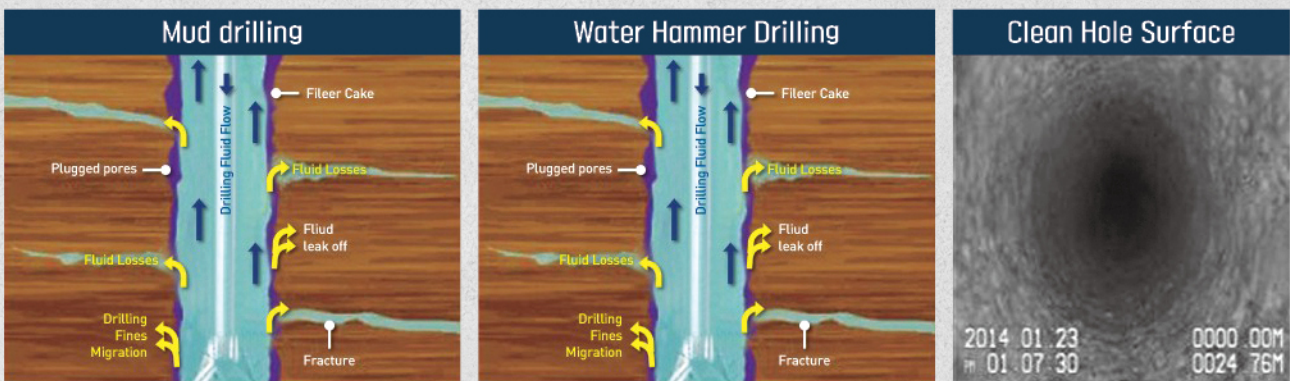
WHAT IS THE WATER HAMMER DRILLING BENEFITS?

► Aquifer penetration Drilling



- Possible to use general drilling rig (no need to use additional rigs)
- No waste of fuel consumption
- Stable drilling speed regardless of geological condition
- No aquifer pollution

► Under Pressure Drilling is Possible



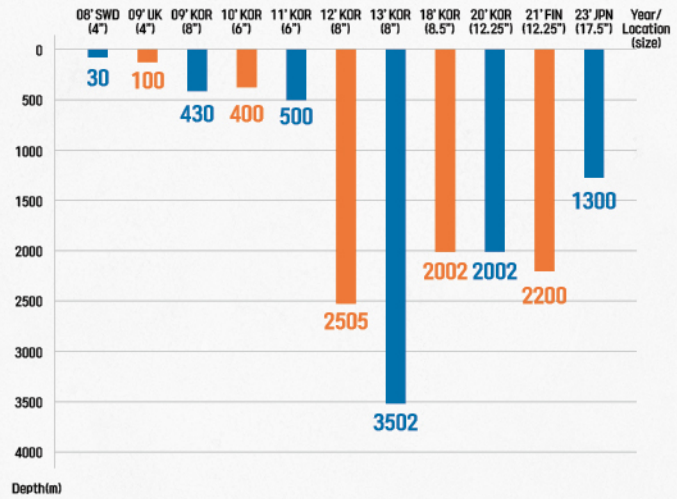
- Prevention of water outflowing
- Prevention of aquifer pollution
- High efficiency for drill cuttings by fast water circulation
- Longer bit life

RECORD

► Deep Hole Drilling Record



★ DRILLING DEPTH DEVELOPMENT HISTORY ★



2021

- Tampere, Finland
- Bit size : 12-1/4"
- Depth : 2,200m
- Deep Geothermal



2023

- Ibuski, Japan
- Bit size : 17-1/2"
- Depth : 1,300m (target)
- Geothermal Power



2023

- Sofiehil, Sweden
- Bit size : 17-1/2"
- Depth : Max 30m
- Piling