

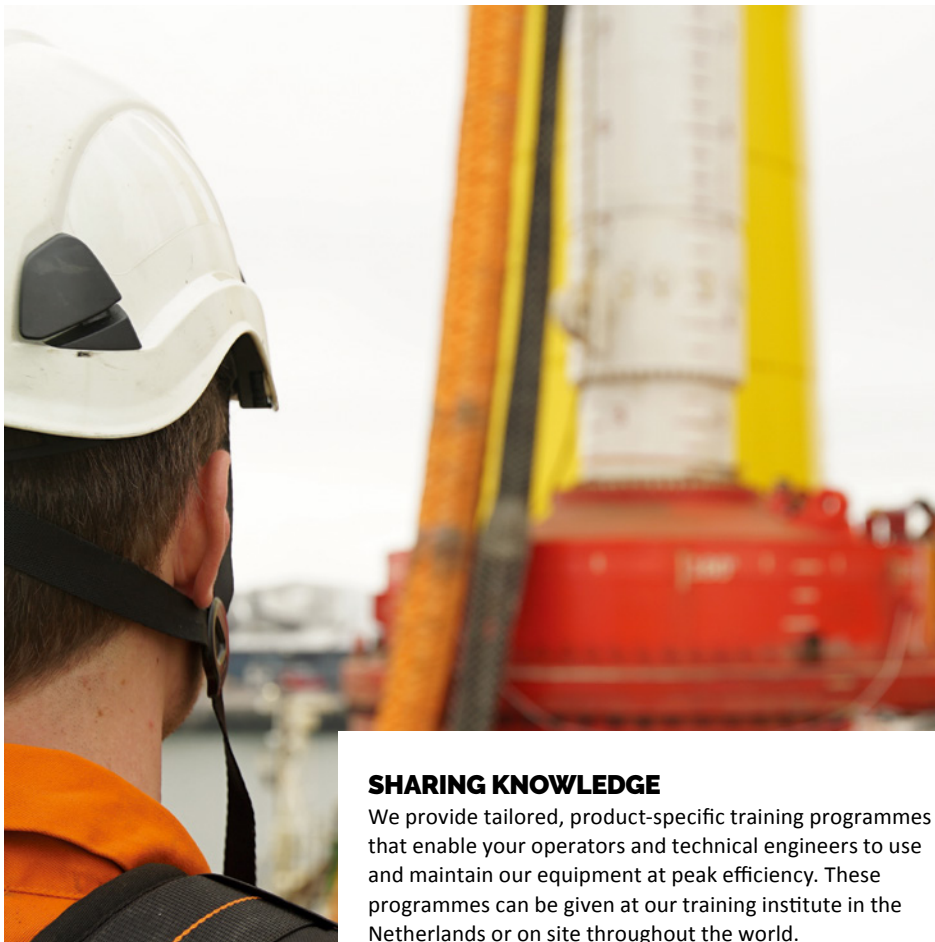
HYDROHAMMER

COASTAL & CIVIL



MORE THAN JUST A HAMMER SUPPLIER

IHC IQIP is your full-service partner for all piling operations both onshore and nearshore. With over 30 years of experience working with clients, providing complete solutions for their complex construction projects, we have developed an unmatched track record. As a result, we know the challenges you face and have the knowledge, experience and flexibility to support you every step of the way.



SHARING KNOWLEDGE

We provide tailored, product-specific training programmes that enable your operators and technical engineers to use and maintain our equipment at peak efficiency. These programmes can be given at our training institute in the Netherlands or on site throughout the world.



WORLDWIDE RENTAL FLEET

With offices, local agents and equipment yards throughout the globe, IHC IQIP currently has the largest and most diverse rental fleet available worldwide.



MAINTENANCE

In need of maintenance, overhaul, repairs or in need of spare parts? IHC IQIP covers it all.



24/7 SUPPORT

We are 24/7 available to answer your operational and technical questions and can send out our service engineers to assist you on your project anywhere in the world.



MIQIP PORTAL

We have developed cutting-edge digital systems that collect data and gain more insight into the piling process. This data can be accessed even remotely on mobile devices through our new MIQIP online portal.

DRIVING RAKED PILES FREE HANGING AT FULL FORCE



JETTIES

Whether they are unloading LNG, oil carriers or berthing vessels, in order to provide an invaluable service, jetties must be able to withstand the full force of nature. Therefore, choosing and installing the foundation in an optimum way is critical. Using the Hydrohammer® can prove to be a perfect solution for installing either steel or concrete foundation piles.

RAKED PILE DRIVING

The majority of jetties consist of a series of bents of raked steel piles, driven into the ground. Traditional methods for raked pile driving are inefficient due to their inability to compensate for the loss of gravitational energy. This is not the case with the Hydrohammer®. By adjusting the gas pressure above the ram's piston head, the ratio between the energy delivered by gravity and by gas energy can be adjusted. When driving raked piles, the gas pressure is increased to compensate for the loss of gravitational energy. Battered piles up to a rake of 1:1 (45 degrees) can therefore be driven at full force. It is even possible to drive horizontally.

LIGHTWEIGHT HAMMER

The ram weight of the Hydrohammer® S-series is relatively light in comparison to its competitors, and the hammer receives a substantial part of its power from acceleration due to the gas pressure on top of the piston. This greatly increases its handling and makes it ideal for constructing jetties.

WELL EQUIPPED FOR ALL HARBOUR-RELATED PILING WORKS



HARBOURS

When it comes to installing foundations and quay walls for complex maritime projects, steel structures are the best solution. As a result of its unique design, the Hydrohammer® is perfectly suited to driving steel piles and essential for a successful installation.

SPECIAL SOLUTIONS

Driving clutched piles is possible with a specially designed clutch sleeve. With this sleeve, the use of a follower or dolly to drive clutched piles is no longer required, making pile driving more cost-effective and efficient. The clutch sleeve also reduces the weight by up to 10t, depending on the follower length. To prevent additional costs incurred as a result of damage to the coating of piles during pile driving, IHC IQIP can equip the inside of the sleeve with synthetic material.



SUPPLYING THE LARGEST HAMMER RANGE IN THE MARKET



BRIDGES

The foundations of a bridge are of critical importance. Not only must they support the entire weight of the bridge, they are also required to withstand dynamic loads, and be resistant to earthquakes. Over the past few decades, upscaling the sizes of bridges and their foundations has become necessary due to heavier traffic and increasing traffic flow.

LARGE DIAMETER PILES

For IHC IQIP, large diameter piles are common practice. Offshore, we have vast experience driving the biggest monopiles with a diameter of up to eight metres. We've taken this experience onto dry land, and are capable of driving any pile size required with our wide range of hammers and sleeves.

Our S-600 Hydrohammer® is used frequently for bridge foundation works all over the world. One of the biggest hammers ever supplied for a bridge foundation project is the S-2000 Hydrohammer®.



YOUR SOLUTION TO DRIVE ALL TYPES OF SHEET PILES AND PROFILES



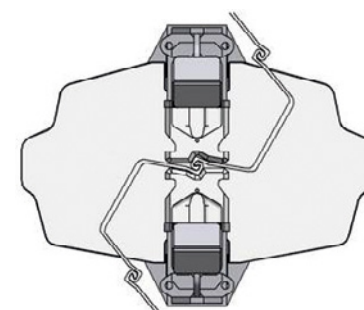
SHEET LEGS

When equipped with sheet legs, the Hydrohammer® is the perfect tool for driving sheet piles. The legs provide the required stability when driving sheet piles in a free-riding mode and eliminate the need for a leader. Many different types of profile can be driven this way, from single and double sheet piles to single and double H-beams, combi walls, and more.

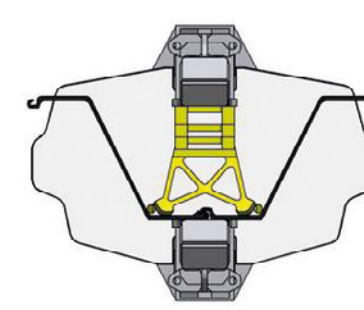
POLYGONAL ANVIL

Another new development is the polygonal anvil. Its special shape enables it to drive a wide range of sheet piles with maximum coverage. This ranges from the small profiles, with a width of 500mm (for example, Hoesch L25) to the big profiles, measuring 700mm in width or 750mm.

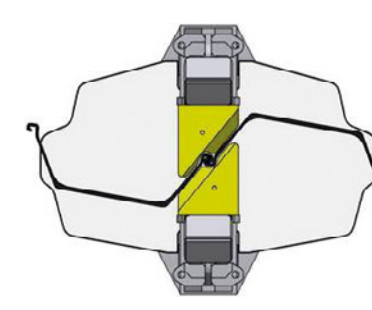
We developed sheet legs for our S-30, S-40, S-70 and S-90 Hydrohammer® models. The solid one-piece upper section has a high rigidity. These sheet legs can be used with the polygonal anvil for double sheet piles, and with an anvil for single sheet piles.



COVERAGE WITH THE POLYGONAL
ANVIL AT THE PROFILE L25



COVERAGE WITH THE POLYGONAL
ANVIL AT THE PROFILE AZ 40-700



COVERAGE WITH THE POLYGONAL
ANVIL AT THE PROFILE AU 26

WHEN EXPLOSIVES ARE NO OPTION



ROCKBREAKING

Equipped with a chisel set, the Hydrohammer® becomes a highly effective and powerful rock breaker. It is able to produce the high impact force necessary for breaking rock, cemented layers, concrete floors and slabs.

CHISEL WITH HOUSING

The Hydrohammer® can be used as a rock breaker both on land and underwater. It is fitted with a special sleeve that features an internal anvil and a chisel. After being driven into the rock, the hammer and chisel are lifted and moved to the next spot. Delivering upward blows and lifting the hammer at the same time strongly facilitates the retraction of jammed chisels.

THE SYSTEM

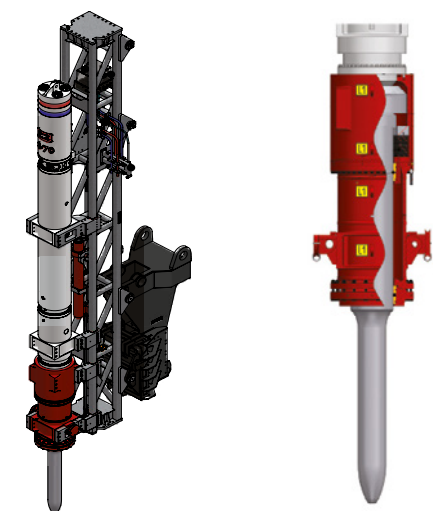
To withstand heavy resistance, the Hydrohammer® must be properly guided in a leader-guide profile. This operating criterion secures the central alignment of the chisel and hammer for optimum energy transfer between ram/anvil and chisel. The position of this leader profile should be fixed during breaking and extracting.

OPERATING METHODS

Different types of handling equipment can be used to lift and position the rock breaker and leader profile, including a piling rig, excavator or backhoe, or a cutter dredger. The choice depends predominantly on the equipment available for/on the project, and on water depth.

ROCK HARDNESS

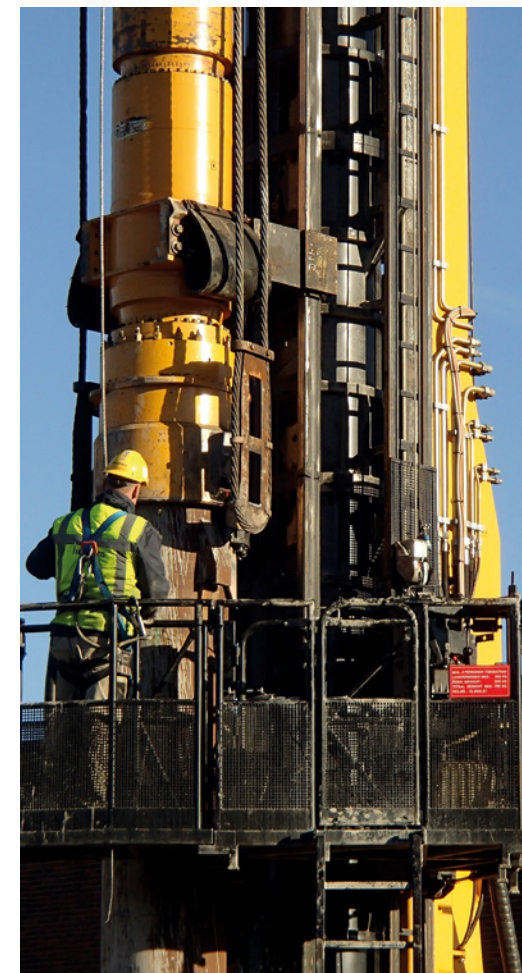
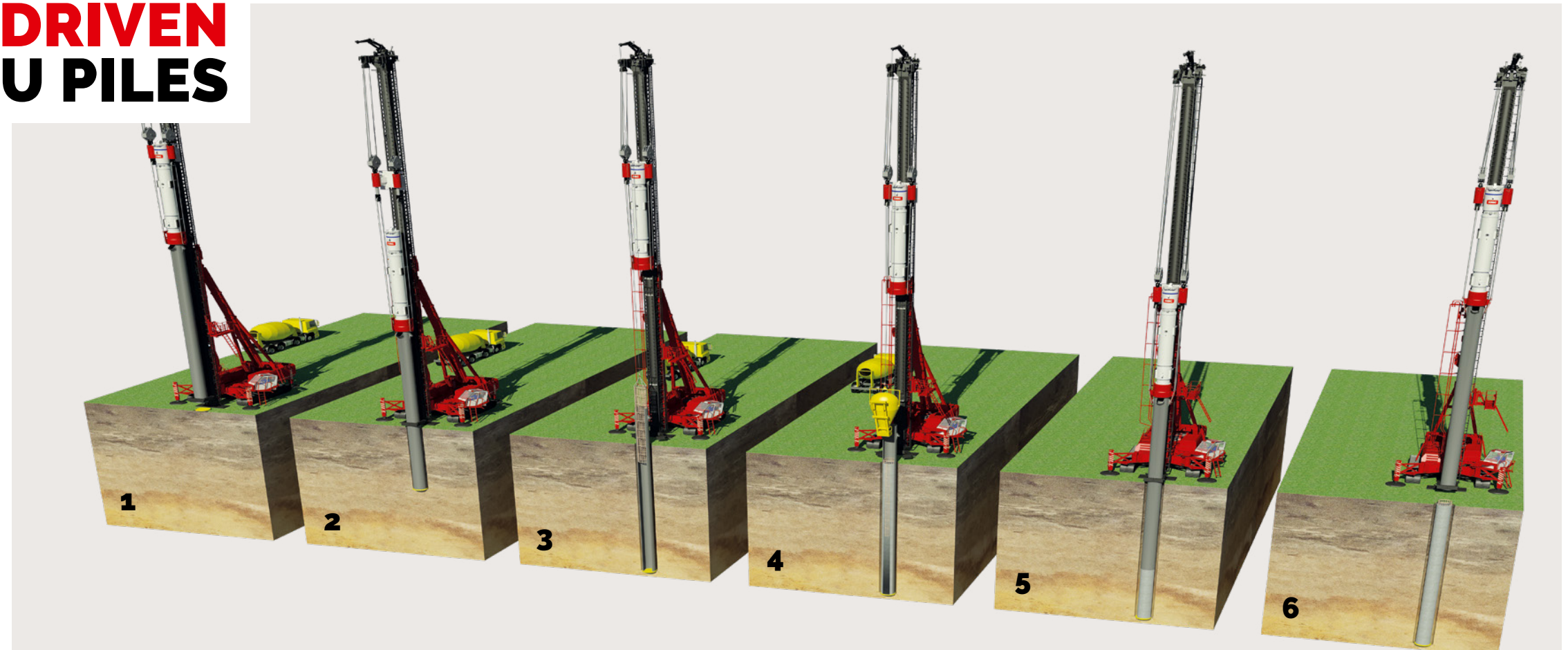
The average compressive strength that a normal cutter dredger can handle is 40MPa. To date, rocks with a hardness up to 180MPa have been successfully broken using an S-70 Hydrohammer® to punch vertical holes in a relatively level surface.



DRIVEN CAST-IN-SITU PILES

CAST-IN-SITU TECHNIQUE

1. The steel casing is placed on the steel cover plate
2. The steel casing is driven to final penetration level
3. A reinforcement cage is placed inside the (empty) steel casing
4. Concrete is poured inside the steel casing
5. The steel casing is extracted by force, in combination with small blows downwards – or even upwards
6. A concrete pile with a high bearing capacity is in place



ADVANTAGES CAST-IN-SITU

One of the unique features of the Hydrohammer® design – besides its sturdiness and high level of controllability – is its ability to facilitate the extraction of casings that have already been driven. This means that only one hammer is needed for both driving and extracting, making the Hydrohammer® ideal for handling cast in-situ (vibro) piles.

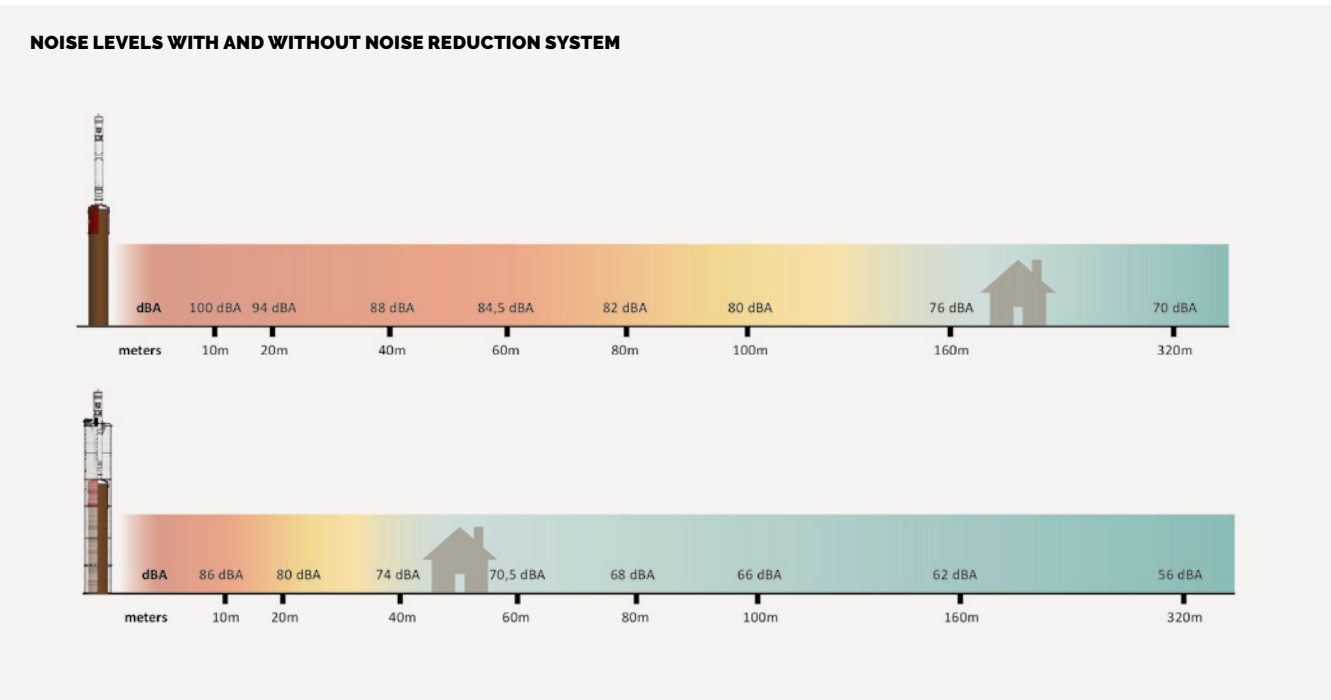
HIGH BLOW RATE WITH MINIMAL ENERGY

During extraction, the Hydrohammer® can achieve a blow rate of 280bpm with minimal energy. These small vibrations in the casing create the tractive force required to pull the casing out of the ground. In case of extremely high friction, the Hydrohammer® can even give upward blows to overcome the soil friction.

VERY ECONOMICAL AND HIGH BEARING CAPACITY

This technique is very economical compared to precast piles, since reinforcement is installed after tube installation instead of being designed with respect to transport and handling. On request, concrete can be delivered within a few hours by a concrete mixer truck, which prevents the storage of precast piles and makes it easier to reach the job site. The reinforcement of pile shaft can be increased at the top of the pile. Due to an increased end bearing and optimal friction along the shaft, a high bearing capacity is usually achieved. Allowable pile loads can be extremely high. Another advantage is that the adjustable pile length can be determined at the job site.

NOISE MITIGATION



To ensure a safe working environment and minimise damage due to noise pollution when piling with the Hydrohammer®, IHC IQIP offers an optional noise reduction system. This consists of an enclosure at the point of impact, and bellow sections around the pile. The design was developed in collaboration with the Dutch research institute TNO. Noise levels can be reduced by 15dB(A), which is a great improvement for noise emission levels on today's construction sites. Our noise reduction system is available for free-hanging and leader-guided pile driving

Reduction in dB(A)	Reduction in sound power	Reduction experience by human ear
1,25	25%	Not audible
3	50%	Just audible
10	90%	Half as much sound compared to the original sound
15	97%	Even less than half the sound compared to the original sound

HORIZONTAL PILE DRIVING

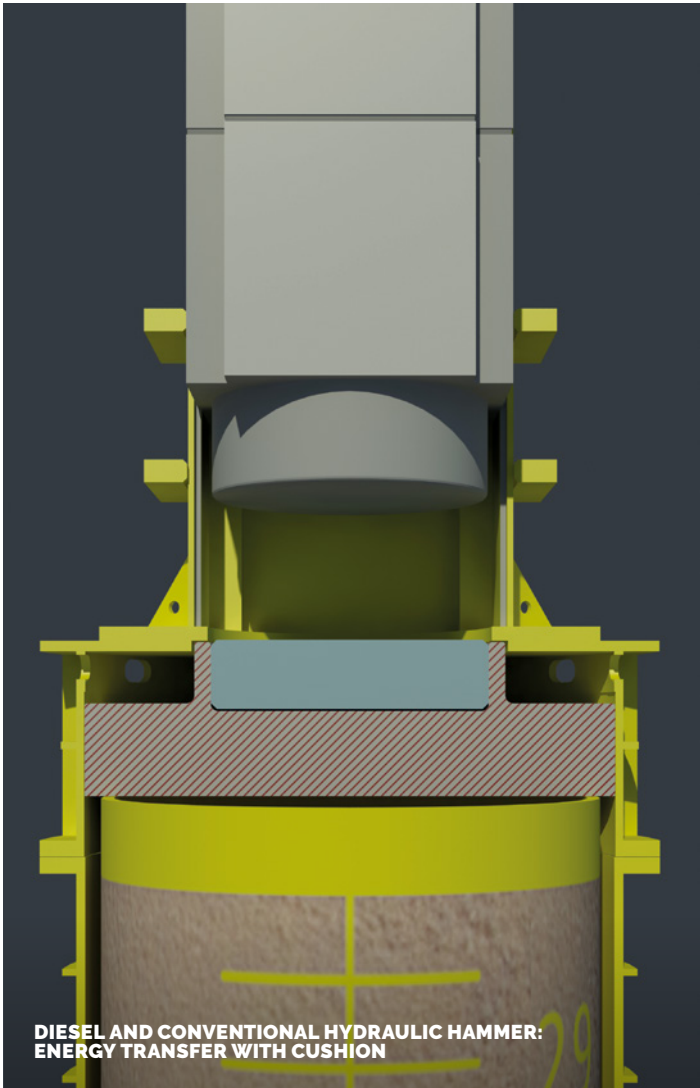
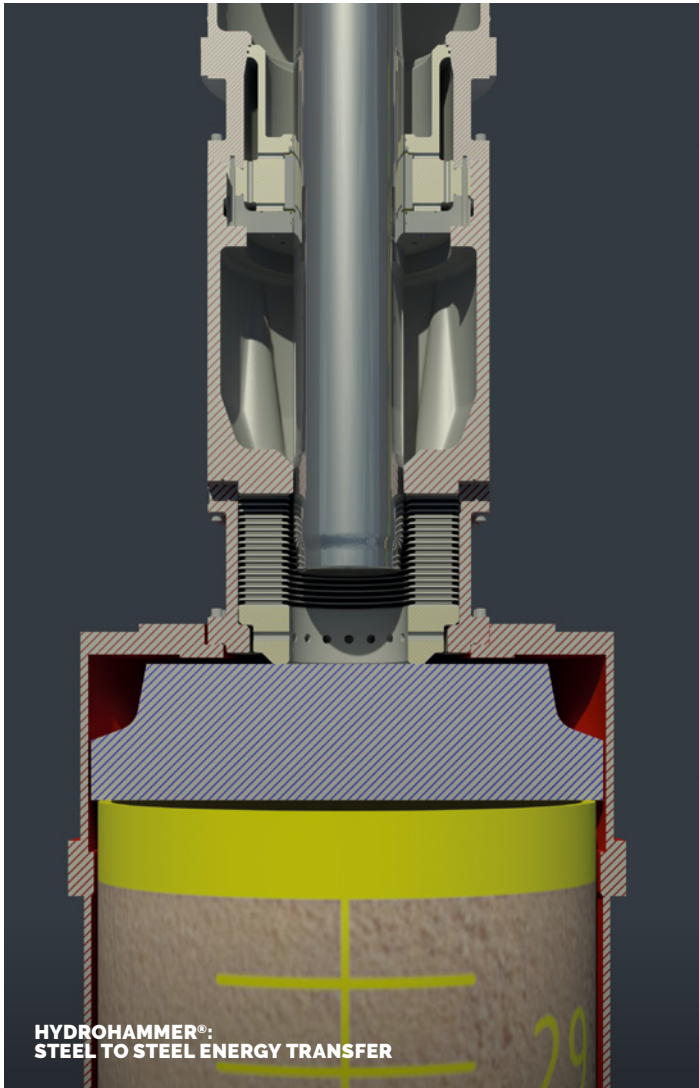


Pipes and piles are usually driven vertically, but in some instances horizontal piling is the only way to go. Horizontal piling requires powerful tools to deliver the amount of driving power or cutting capacity needed. As a result of two unique features in the design of the hydraulically driven, double-acting Hydrohammer®, it is possible to operate under every inclination – even horizontally.

The Hydrohammer® is not only capable of installing piles and pipes horizontally, but it can also be used to remove disused piles and pipes from the ground.

- HYDROHAMMER® ADVANTAGE OF HORIZONTAL DRIVING**
- requires only a relatively small excavation
 - used extensively for driving piles up to three metres in diameter
 - faster tube installation progress
 - ability to remove disused service lines and tubes
 - no modifications to the Hydrohammer® are required
 - safer operation – working tool is outside the tube, not inside.

EFFICIENCY HYDROHAMMER®



HAMMER COMPARISON

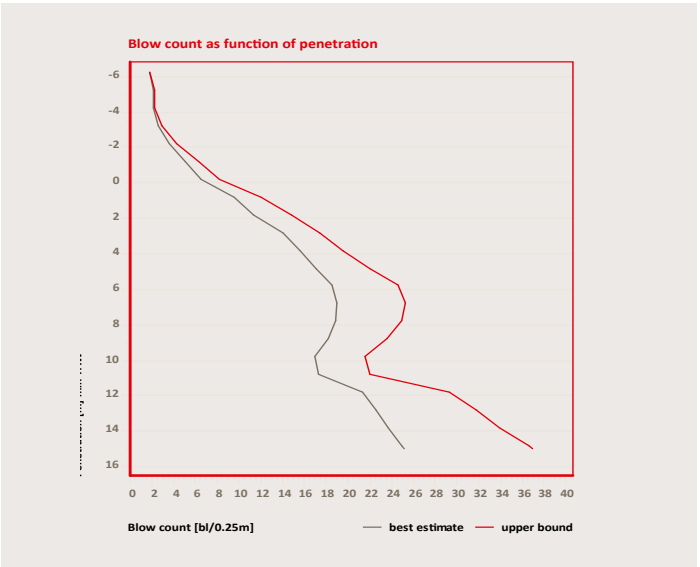
Most piling hammers are rated by their potential energy. However, the Hydrohammer® is rated by its kinetic energy. Furthermore, steel-to-steel energy transfer ensures an extremely high peak force in the pile. Therefore, it is incorrect to only compare hammers on (potential) energy.

In order to make an accurate comparison between the different hammer types, the actual ability of a hammer to overcome soil resistance is far more important than its rated energy. The below table compares energy between the different hammer types based on the driveability.

COMPARISON ON ENERGY NEEDED

HAMMER TYPE	S-30	S-40	S-70	S-90	S-120	S-150	S-200	S-280	S-350	S-500
	kNm (KJ)	kNm (KJ)	kNm (KJ)	kNm (KJ)	kNm (KJ)	kNm (KJ)	kNm (KJ)	kNm (KJ)	kNm (KJ)	kNm (KJ)
Steel to steel (Hydrohammer®)	30	40	70	90	120	150	200	280	350	500
Diesel hammers	72	98	170	220	290	366	488	785	920	1220
Conventional hydraulic hammer	40	57	100	130	170	216	289	400	504	675

HAMMER TYPE	S-30	S-40	S-70	S-90	S-120	S-150	S-200	S-280	S-350	S-500
	Kip.ft	Kip.ft	Kip.ft	Kip.ft	Kip.ft	Kip.ft	Kip.ft	Kip.ft	Kip.ft	Kip.ft
Steel to steel (Hydrohammer®)	22	30	52	66	89	111	148	207	258	369
Diesel hammers	53	72	125	162	214	270	260	579	679	900
Conventional hydraulic hammer	30	42	74	96	125	159	213	295	372	498



DRIVEABILITY

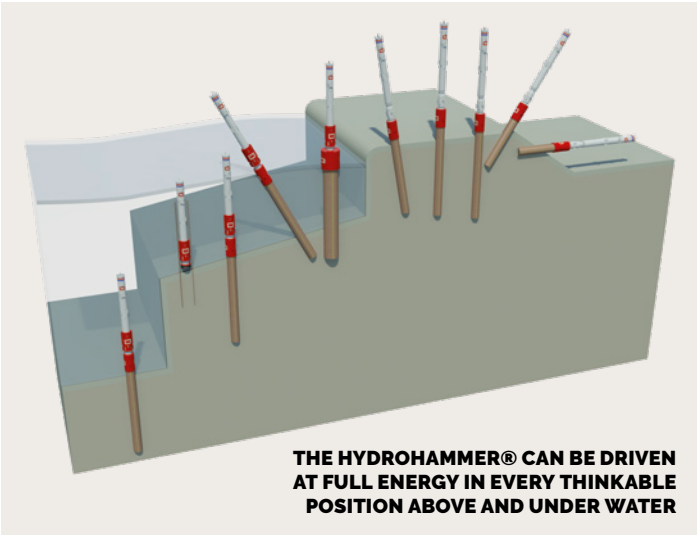
The correct choice of hammer can only be made after careful interpretation and assessment of the properties of the soil. To support clients, IHC IQIP employs a team of experienced engineers to assist them with pre- and post-pile driving analyses. These driveability studies are carried out using the most sophisticated computer programs (GeoWave). Driveability studies are performed for a best estimate but also take into account an upper bound situation. In the upper bound situation, a 30% higher soil resistance is taken into account. This gives a good indication of the expected driveability.

HAMMER CONTROL AND MONITORING

All hydraulic hammer functions are electronically controlled and monitored by our new generation control and monitoring system. This system focuses on automatic pile driving based on the desired pile velocity, blow rate and blow energy, making the system flexible and easy to use.

HIGHLIGHTS

- maximisation of equipment utilisation and efficiency
- wireless digital communication and control
- increasing equipment reliability and lifespan through comprehensive diagnostics
- data registration and reporting system for project data, settings, configuration and important measurements
- integration of documentation in the control system.



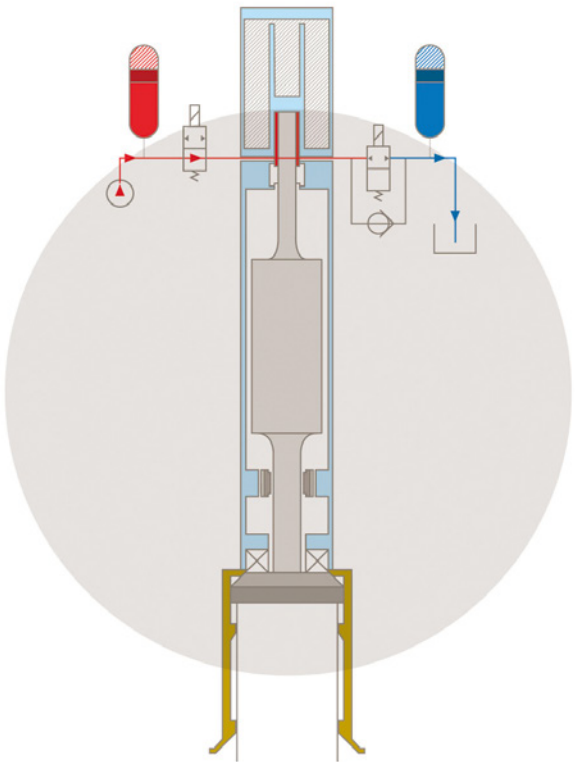
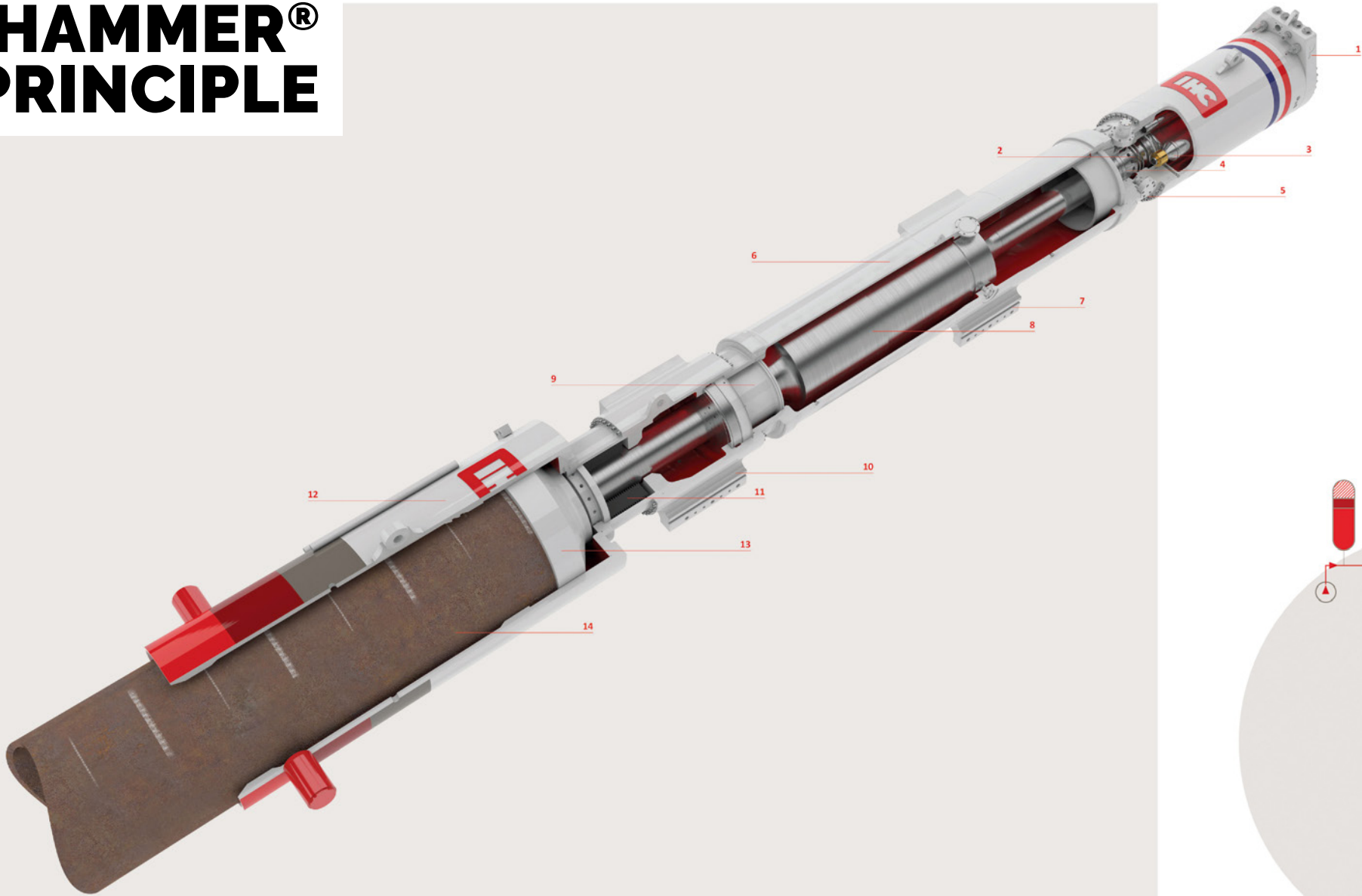
CUSTOMER PORTAL MIQIP

MIQIP is a globally connected platform that will provide you with operational intelligence on your foundation installation assets. Hammer operators, project managers and service crew now have direct access to all information needed for efficient and reliable reporting. MIQIP makes jobsite preparation possible from the comfort of your office. The portal provides an up –to-date transparent overview of the documentation and certification and enables you to easily push piling plans and equipment spreads configurations to the selected C-36 control units.

HYDROHAMMER® OPERATING PRINCIPLE

HYDROHAMMER®

- 1. Connection plate
- 2. Piston
- 3. Accumulator
- 4. Upper bearing
- 5. Valve ring
- 6. Hammer housing
- 7. Upper leader attachment
- 8. Ram
- 9. Lower bearing
- 10. Lower leader attachment
- 11. Shock absorber
- 12. Pile sleeve
- 13. Anvil
- 14. Pile



The operating cycle begins with the lifting phase of the ram (the ram weight, ram pin and piston rod are forged into one piece). Here, valve P in the pressure line is opened and valve R in the return line is closed. When the preset stroke position is reached, the valves are automatically reversed, which allows the ram to start its downward stroke. The ram is accelerated by gravity and by the pressure of the gas above the piston and reaches a maximum acceleration of 2g. This reduces the maximum stroke that is required, and at the same time increases the blow rate of the hammer.

After impact, the cycle is repeated automatically. Due to the independently set acceleration force, the IHC Hydrohammer® can operate at any inclination – even horizontally. The hammer can operate either leader-guided or free-hanging.

HIGHLIGHTS

Energy transfer

Steel-to-steel energy transfer ensures extremely high peak force in the pile.

Solid piece ram

Ram weight, ram pin and piston rod are forged into one piece, eliminating the risk of the parts separating.

Material

Forged alloy steel guarantees durability.

Shock absorber

The robust and tested construction sustainably resists the reaction forces from the pile.

Auxiliary equipment

Can be equipped with rock breaker chisels, noise reduction bellows, and sheet piling and pile guides in all sizes.

Hammer control

Adjustable blow count per minute and impact energy.

Real time monitorin

Piling data is directly printed on site and/or stored to allow detailed analysis.

Environmentally friendly

Biodegradable oil can be used, and noise reduction is optimised with noise reduction packages.

Weight

10-35% lighter than other hammer types due to accelerated ram weight.

Multifunctional

Suitable for operation above and below the water.

Modular structure

Any parts that may require attention in between major services are easily accessible.

Inclination

Easy to operate at full power at any inclination.

TECHNICAL DATA

IMPERIAL

HAMMER S SERIES		S-30	S-40	S-70	S-90	S-120	S-150	S-200	S-280	S-350	S-500	S-600
Max. blow energy	lb.ft	22,127	29,503	51,630	66,381	88,508	110,635	147,513	206,518	258,147	368,783	442,539
Min. blow energy*	lb.ft	2,213	2,950	5,163	6,638	8,885	11,063	14,751	20,652	28,765	36,848	44,254
Blowrate	bl/min	65	65	50	46	44	44	45	45	40	45	44
Ram weight	s	3,527	4,850	7,716	9,921	13,668	16,534	22,046	29,982	36,000	55,115	66,138
Hammer weight	s	8,599	10,362	18,298	21,348	31,526	35,714	56,878	67,240	72,000	126,764	141,093
Length of hammer	ft	20.00	22.47	24.28	26.43	26.79	29.2	29.84	34.09	37,35	39.18	41.72
Oil flow	g/min	46	46	66	66	122	122	185	185	211	423	476
Power pack type		P 175	P 175	P 250	P 250	P 460	P 460	P 700	P 700	P 700	O.R.	O.R.

HAMMER S SERIES		S-800	S-1200	S-1400	S-1800	S-2000	S-2500	S-3000	S-4000
Max. blow energy	lb.ft	590,056	885,079	1032,952	1327,618	1475,131	1843,905	2212,686	2950,248
Min. blow energy*	lb.ft	59,005	88,508	103,259	132,762	147,513	199,141	281,748	292,812
Blowrate	bl/min	45	40	35	35	35	32	35	36
Ram weight	s	88,183	132,275	152,116	198,413	220,459	275,577	330,693	440,924
Hammer weight	s	182,981	308,642	326,279	454,145	487,213	573,201	639,340	947,987
Length of hammer	ft	47.93	46.91	52,79	54.17	56.87	62.42	68.09	66.96
Oil flow	g/min	581	871	871	871	1.162	1.162	1.347	1.744
Power pack type		O.R.	O.R.	O.R.	O.R.	O.R.	O.R.	O.R.	O.R.

HAMMER SC SERIES		SC-110	SC-150	SC-200
Max. blow energy	lb.ft	81,132	110,635	147,513
Min. blow energy*	lb.ft	8,113	11,063	14,751
Blowrate	bl/min	45	45	45
Ram weight	s	17,416	24,250	29,982
Hammer weight	s	31,085	41,226	58,422
Length of hammer	ft	18.88	21.75	18.8
Oil flow	g/min	122	122	185
Power pack type		P 460	P 460	P 700

POWER PACK TYPE		P-175	P-250	P-460	P-700
Max. pressure	psi	4,351	5,076	4,786	4,931
Max. oil flow	g/min	46	66	122	185
Power	hp	150	228	526	700
Length	ft	8.57	11.48	13.22	15.91
Width	ft	3.94	5.05	5.07	6.23
Height	ft	5.82	6.71	7.30	7.69
Net. Weight	lbs	5,551	7,495	11,905	14,550
Weight incl. fuel and oil	lbs	8,378	9,921	14,991	20,943

**The standard minimal energy setting is about 10% of the hammer’s maximum energy.
When using the high frequency/low energy mode, the energy can be reduced to a minimum of 2% to 5%.*

METRIC

HAMMER S SERIES		S-30	S-40	S-70	S-90	S-120	S-150	S-200	S-280	S-350	S-500	S-600
Max. blow energy	kNm (KJ)	30	40	70	90	120	150	200	280	350	500	600
Min. blow energy*	kNm (KJ)	3	4	7	9	12	15	20	31	39	55	66
Blowrate	bl/min	65	65	50	46	44	44	45	45	20	45	44
Ram weight	ton	1.5	2.2	3.5	4.5	6	7.5	10	14	18	25	30
Hammer weight	ton	4	4.7	8.5	10	14.5	16.5	27	31	36	60	65
Length of hammer	mm	6,100	6,762	7,418	8,168	8,296	8,986	9,130	10,390	11,384	11,943	12,745
Oil flow	l/min	175	175	250	250	460	460	700	700	700	1600	1800
Power pack type		P 175	P 175	P 250	P 250	P 460	P 460	P 700	P 700	P 700	O.R.	O.R.

HAMMER S SERIES		S-800	S-1200	S-1400	S-1800	S-2000	S-2500	S-3000	S-4000
Max. blow energy	kNm (KJ)	800	1,200	1,400	1,800	2,000	2,500	3,000	4,000
Min. blow energy*	kNm (KJ)	88	132	154	198	220	270	382	397
Blowrate	bl/min	45	38	35	35	35	32	35	36
Ram weight	ton	40	60	70	90	100	125	150	200
Hammer weight	ton	85	145	150	215	230	260	290	430
Length of hammer	mm	14,535	14,300	14,945	16,630	17,370	19,025	20,755	20,410
Oil flow	l/min	2,200	3,300	3,300	3,300	4,400	4,400	5,100	6,600
Power pack type		O.R.	O.R.	O.R.	O.R.	O.R.	O.R.	O.R.	O.R.

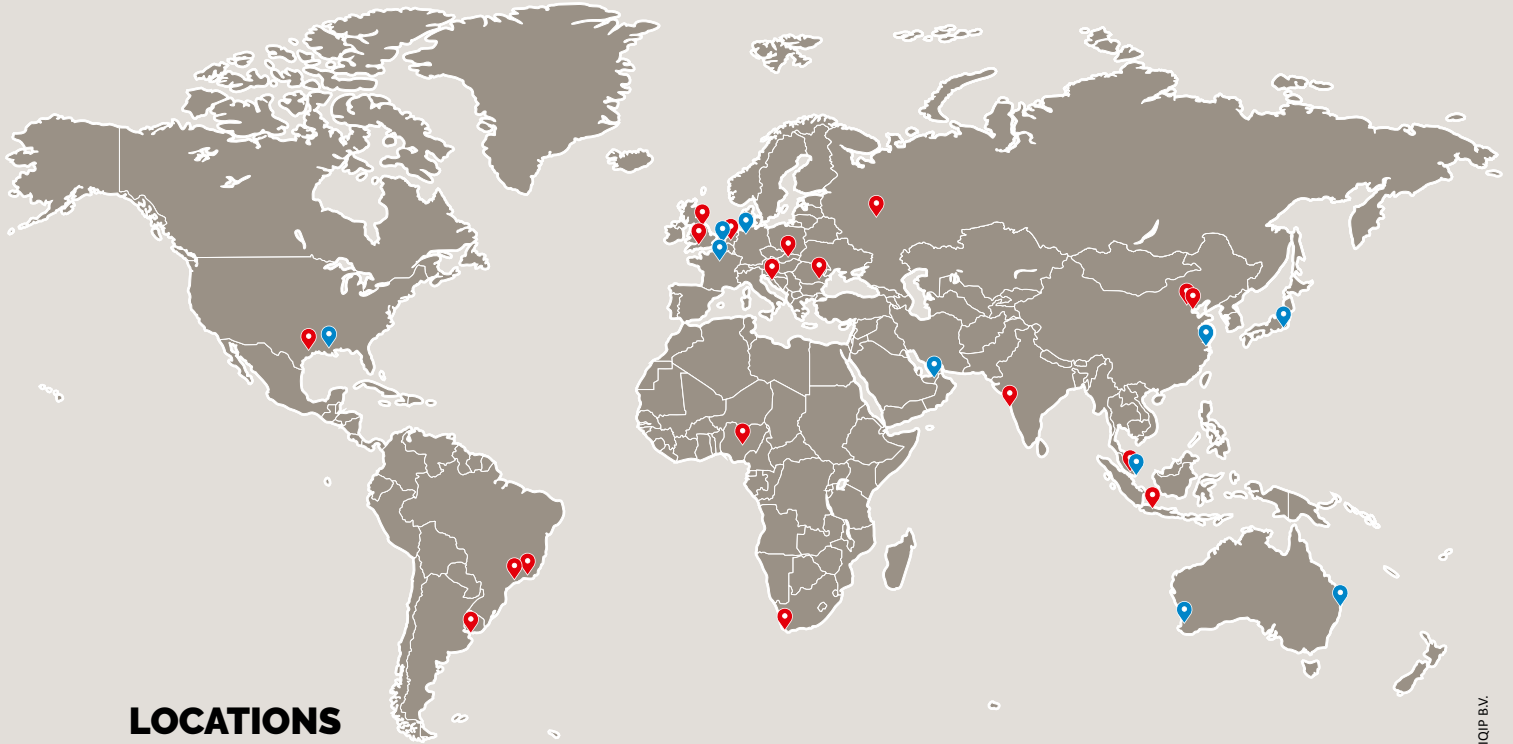
HAMMER SC SERIES		SC-110	SC-150	SC-200
Max. blow energie	kNm (KJ)	110	150	200
Min. blow energy*	kNm (KJ)	11	15	20
Blowrate	bl/min	45	45	45
Ram weight	ton	8	11	14
Hammer weight	ton	16	19,5	29
Length of hammer	mm	5,660	6,445	5,975
Oil flow	l/min	460	460	700
Power pack type		P 460	P 460	P 700

POWER PACK TYPE		P-175	P-250	P-460	P-700
Max. pressure	bar	300	350	330	340
Max. oil flow	l/min	175	250	460	700
Power	kW	110	168	328	515
Length	mm	2,613	3,500	4,015	4,850
Width	mm	1,200	1,540	1,689	1,900
Height	mm	1,783	2,044	2,225	2,346
Net. Weight	ton	2.5	3.4	5.4	6.6
Weight incl. fuel and oil	ton	3.8	4.5	6.8	9.5

**The standard minimal energy setting is about 10% of the hammer’s maximum energy.
When using the high frequency/low energy mode, the energy can be reduced to a minimum of 2% to 5%.*

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WHATEVER THE CHALLENGE WE'RE ALWAYS CLOSE BY



LOCATIONS

EUROPE

THE NETHERLANDS
Sliedrecht

CROATIA
Rijeka

FRANCE
Verberie

GERMANY
Bremen

SLOVAKIA
Komárno

ROMANIA
Bucharest

UNITED KINGDOM
Newcastle
Stocksfield
Port of Blyth

RUSSIA
Moscow

AFRICA

NIGERIA
Lagos

SOUTH AFRICA
Cape Town

ASIA

INDIA
Mumbai

JAPAN
Tokyo

MALAYSIA
Johor Bahru

P.R. OF CHINA
Beijing
Shanghai
Tianjin

REP. OF SINGAPORE
Singapore

INDONESIA
Jakarta

AUSTRALIA
Perth
Brisbane

MIDDLE EAST

UNITED ARAB EMIRATES
Dubai

NORTH AMERICA

USA
Broussard, LA
Houston, TX



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BRAZIL
São Paulo
Rio de Janeiro

URUGUAY
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