



ANRV Hydraulic Inflating Hammer Performance Introduction

Company profile by ANRV

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Product development background

In foreign countries, as early as 1967, Krupp introduced the first hydraulic breaker. Hydraulic breakers have undergone over 60 years of development abroad, evolving from the initial complex structure and single functionality to today's diversified and serialized products. Moreover, innovation in various fields has reached its peak, leading to the emergence of many differentiated hydraulic breaker accessories. Overall, foreign hydraulic breakers have the following advantages:

- (1) High impact energy: The Korean Soosan series adopts a nitrogen hydraulic hammer.
- (2) High energy efficiency: Krupp's variable frequency mode from Germany.
- (3) Incorporation of empty hitting technology: Krupp from Germany can work without a pressing rod, and there is no damage to the hydraulic breaker components.
- (4) Introduction of "intelligent crushing impactor technology": Stanley hydraulic breakers from the United States adjust output energy based on resistance to impacts, continuously controlling impact energy.
- (5) Low noise: Korean Rammer and German Krupp's integral hydraulic breakers mostly use fully enclosed shells to minimize noise pollution.
- (6) Durability of wearing parts and low failure rate.

In China, hydraulic hammer technology was introduced in the 1970s and was designated as a key technology project during the "Sixth Five-Year Plan" period. Since the early 1980s, many Chinese institutions have been involved in the research and development of hydraulic hammers, including the Beijing Metallurgical Equipment Research Institute, Beijing University of Science and Technology, and Central South University, among others. This led to the emergence of some well-known enterprises in the industry at that time, such as Giant Company, Changzhi Hydraulic, and Hunan Shanhe. Hydraulic breakers are a type of hydraulic attachment that relies mainly on the host machine for operation. They convert the hydraulic energy provided by the host machine into kinetic energy for impact, thereby achieving the function of breaking and demolition.

In the past two decades, hydraulic breakers in China have experienced rapid development, especially with the continuous research and development efforts of domestic companies like Giant, coupled with industry training. This has fueled the vigorous development of hydraulic hammers domestically. Currently, hydraulic hammer technology in China is continuously being updated, but it has been largely following the footsteps of foreign counterparts without bold innovation and invention. There is still a certain gap compared to advanced foreign technologies. While China may have surpassed foreign countries in terms of quantity, it has not yet surpassed them in terms of quality and technology.

Analysis of user mental change



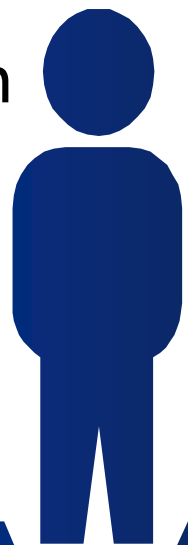
Labor cost Mental transformation

Labor costs are increasing, leading to the adoption of highly intelligent and reliable products to achieve greater efficiency and lower costs by replacing manual labor.



Environmental awareness Scene transformation

In line with the national strategy of dual carbon economy, users will gradually consider environmentally friendly products as part of their mental considerations.



Construction scenario Mental transformation

As the era of large-scale construction gradually recedes and the era of excessive profits in construction comes to an end, the dimension of refined construction is increasing, and the market is calling for new products with growing breadth.



New users Mental transformation

With the overall improvement of social welfare, the national happiness index is on the rise. Over the next decade, those born in the 1990s and 2000s will become the mainstay of society. The mental strength of this new generation will gradually overturn traditional construction scenes. There will be a growing demand for more intelligent, highly reliable, durable, and environmentally friendly application products.(especially products like the Hydraulic Inflating Hammer and the Universal Quick Couplers.)



Scenario and requirement change analysis

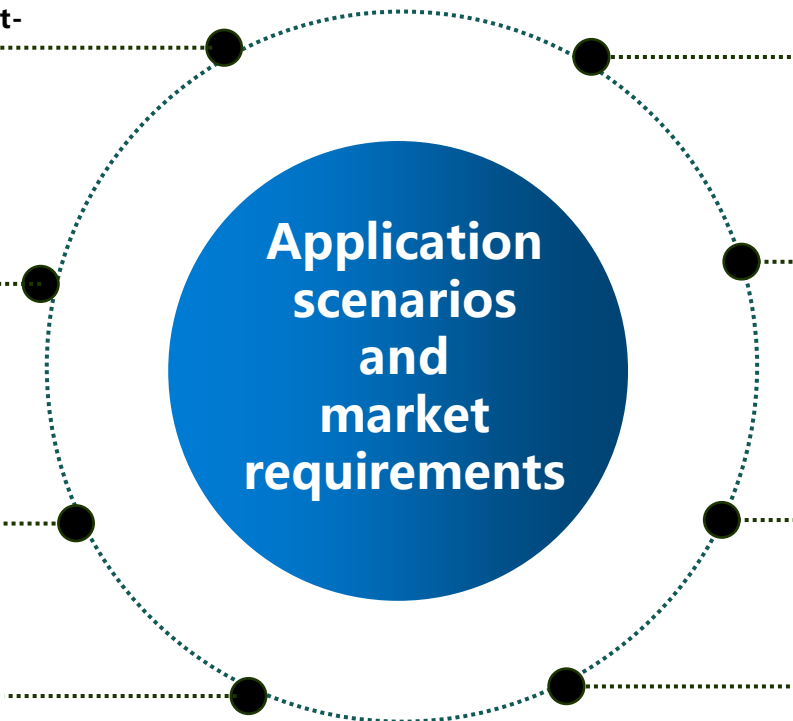
In high-frequency usage scenarios, **domestic brands dominate the application product market**
in low-frequency usage scenarios, **imported high-end brands are more prevalent.**

The mindset of large enterprises such as central enterprises and state-owned enterprises is reflected in their preference for well-established brands with high reliability and strong financial backing. They typically prioritize quality and reliability over cost-effectiveness, although there has been a shift in recent years towards considering products with higher value for money.

The application scenarios where pure hydraulic hammers excel over nitrogen hydraulic hammers include metallurgy, cement, chemical industry, sand and gravel aggregate, as well as soil sampling in tunnels.

Pure hydraulic hammers come with a high price tag, elevated usage costs, and may suffer from delayed service and extended ordering cycles.

The high-noise products domestically are having a significant impact on the environment, with the current level of government intervention being insufficient.



Domestic manufacturing companies have low recognition, and there is a shortage of advanced research and development personnel.

The industry is facing severe overcapacity, with profits for some large-scale products nearly non-existent.

In the existing market, disruptive differentiation across various industries will undoubtedly bring new opportunities for intelligent, highly durable, and user-friendly products.

Survival of the fittest; only the products best suited to users can endure.

Analysis of the advantages and disadvantages of pure hydraulic and nitrogen hydraulic hammers.



nitrogen hydraulic

The built-in directional valve ensures quick response and high frequency operation;
It demonstrates superior efficiency in soft working conditions, offering 1.5 times the output volume compared to nitrogen hydraulic hammers of the same model;
Its unique empty hitting structure the need for a driving rod, allowing for instant striking functionality;
This feature provides significant advantages in industries such as construction demolition, tunnel excavation, and refractory brick removal from furnaces;
Additionally, the hammer's integrated design minimizes noise while maintaining a compact and lightweight profile; On the other hand, foreign hydraulic hammers have drawbacks, including insufficient impact force against hard materials;
Inconvenient maintenance, long lead times for spare parts procurement;
High prices, typically three to five times that of domestic models of the same type.

pure hydraulic

Superiority of nitrogen hydraulic hammers:

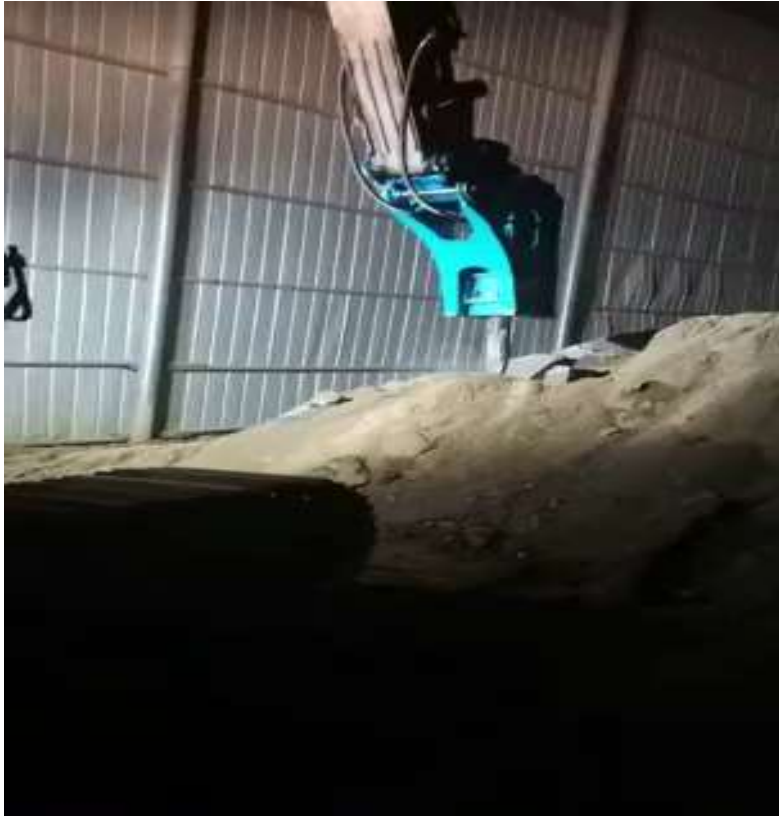
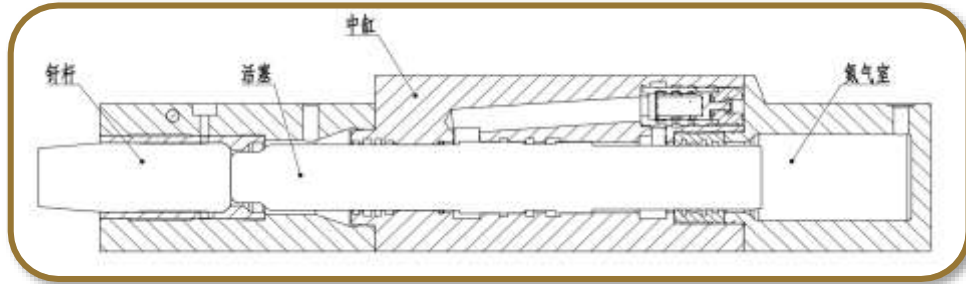
1. High impact force.
2. Low price, relatively economical.
3. Large market retention.

Shortcoming of domestic hydraulic hammers:

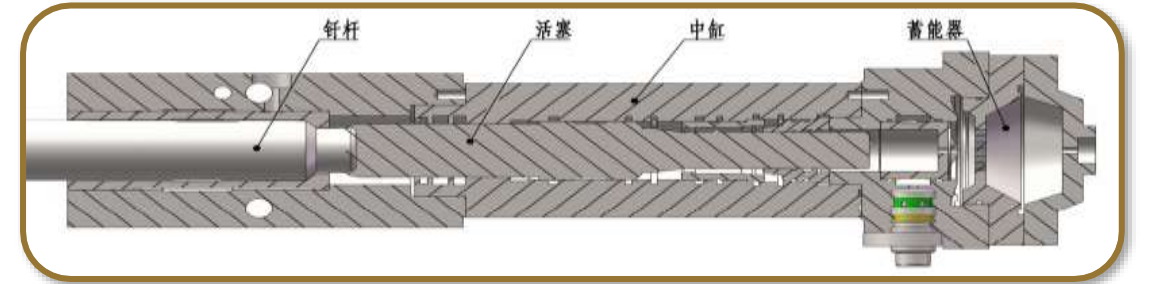
1. Slow frequency, cannot perform empty hitting.
2. Heavy, bulky, and less stable compared to foreign models.
3. It mostly used in mining industry and cannot suitable for certain specific conditions.

hydraulic flating

The product combines the advantages of pure hydraulic hammers (such as Atlas) with no need for compression and high frequency, as well as the high impact force of nitrogen hydraulic hammers (such as Furukawa). It is suitable for various applications, especially in secondary crushing in mines, the efficiency can be increased by 50%. In tunneling and demolition fields, because there is no need for compaction and the feature of working at the touch of a button reduces the driver's need to accurately find the point, which can greatly improve the operation efficiency.



Nitrogen hydraulic: High impact force、Slow frequency、cannot empty hitting



Pure hydraulic: Low impact force、Fast frequency、no need to press the drill rod

ANRV Hydraulic Inflating Hammer

Filling the domestic gap

It combines the advantages of both pure hydraulic and nitrogen hydraulic hammers.

ANRV sets the national standard for hydraulic inflating hammers, holds invention patents, and possesses independent intellectual property rights

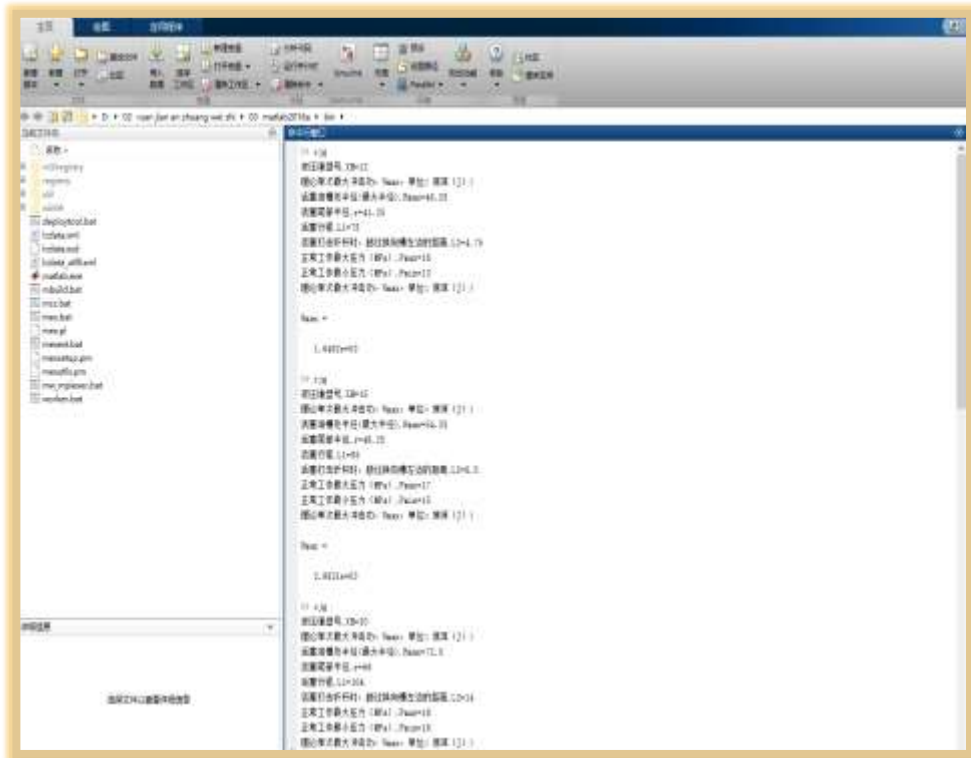
It is the first globally to incorporate Tesla valves, enhancing product durability. Large-scale hammers are equipped with remote timing and GPS positioning via an accompanying mobile app, with remote non-destructive testing capabilities currently under development.





Product principle and parameters

Its specific working principle: (see the diagram above) A buffer chamber (14) and an empty hitting valve (18) are installed between the high-pressure oil system. When the piston (5) enters the buffer chamber (14), the empty hitting valve (18) opens, allowing high-pressure oil to enter the buffer chamber (14) and push the piston (5) out, enabling the hydraulic hammer to work. When the piston (5) leaves the buffer chamber (14), the empty hitting valve (18) closes, cutting off the oil flow. This solves the technical problem of needing to tighten the rod (10) during the startup and operation of the hydraulic hammer, using the rod (10) to push the piston (5) out of the buffer chamber (14).



Impact energy calculation

Using self-programmed software named MATLAB.

2) Formulas and parameters

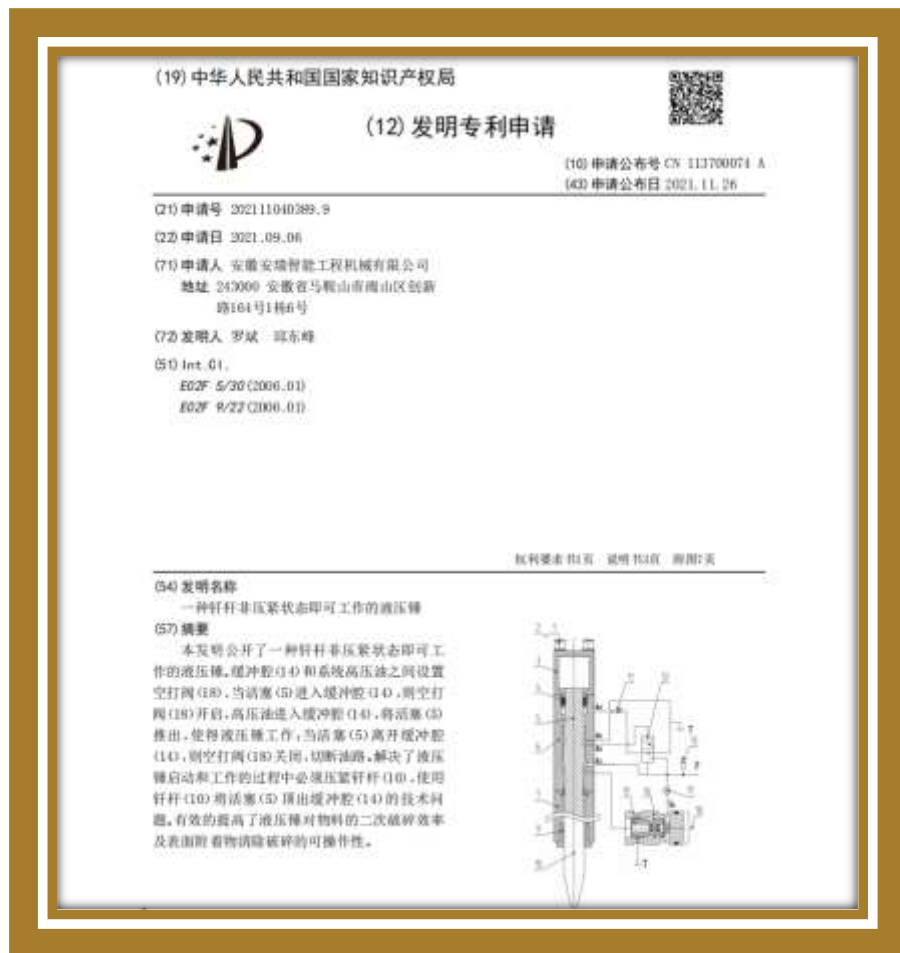
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XH=input('Hydraulic hammer type,XH=');
disp('Theoretical single maximum impact work, Wmax, units: Joule (J)');pause
Rmax=input('Piston oil groove radius (Max.),Rmax=');
r=input('Piston tail radius,r=');
L1=input('Travel of piston,L1=');
L2=input('The distance to the left of the reversing groove when the piston strikes the drill rod,L2=');
Pmax=input('Maximum pressure for normal operation (MPa) ,Pmax=');
Pmin=input('Minimum pressure for normal operation (MPa) ,Pmin=');
disp('Theoretical single maximum impact work, Wmax, units: Joule (J)');pause
Wmax=pi*(Rmax^2-r^2)*(L1+L2+3)*(0.5*Pmax+0.5*Pmin)*10^-3
    
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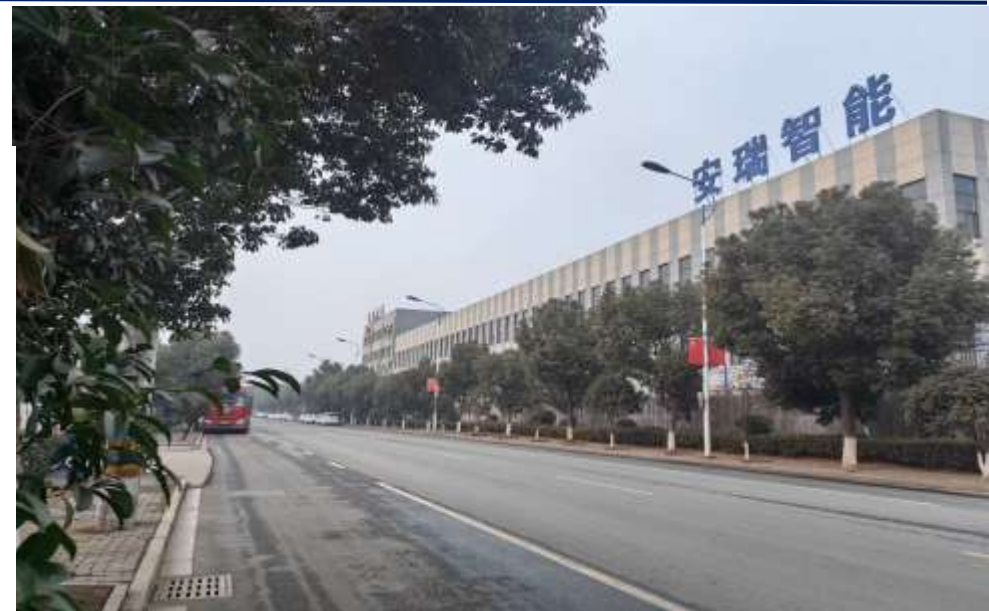
3) Result

- Hydraulic hammer type,XH=30F
- Theoretical single maximum impact work, Wmax, units: Joule (J)
- Piston oil groove radius (Max.),Rmax=72.5
- Piston tail radius,r=66
- Travel of piston,L1=104
- The distance to the left of the reversing groove when the piston strikes the drill rod,L2=14
- Maximum pressure for normal operation (MPa) ,Pmax=18
- Minimum pressure for normal operation (MPa) ,Pmin=16
- Theoretical single maximum impact work, Wmax, 单位: 焦耳 (J)
- Wmax =5817J

Product intellectual property



Strict production of products





Top type:
Large working range



Box type: Special type
for high temperature environment of steel mill



Side type:
Special demolition type

Performance test report

The Result of Hydraulic Hammer in the Test Bench

型号(Type of Hydraulic Hammer):AR30F ; 测试日期(Date of Test):21.05.15

活塞平均末速度(The Piston Impact Velocity): 10.6 m/s

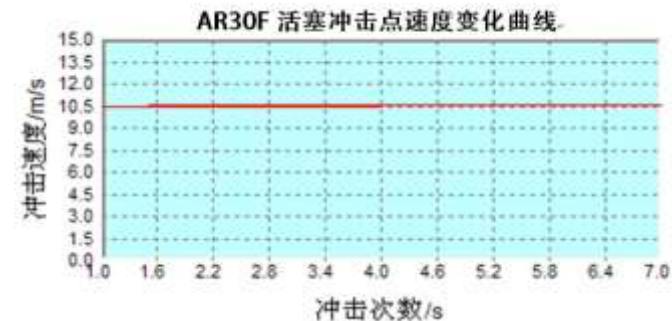
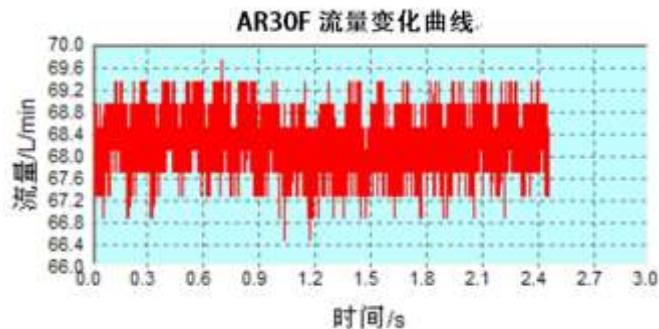
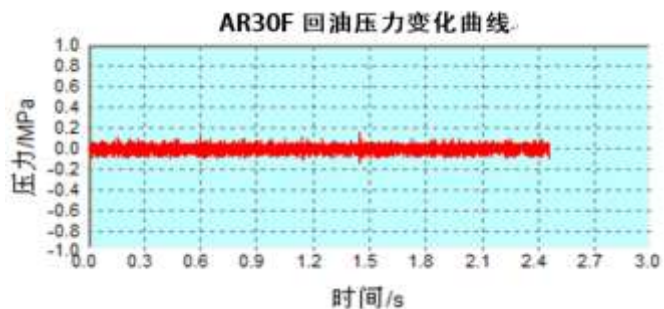
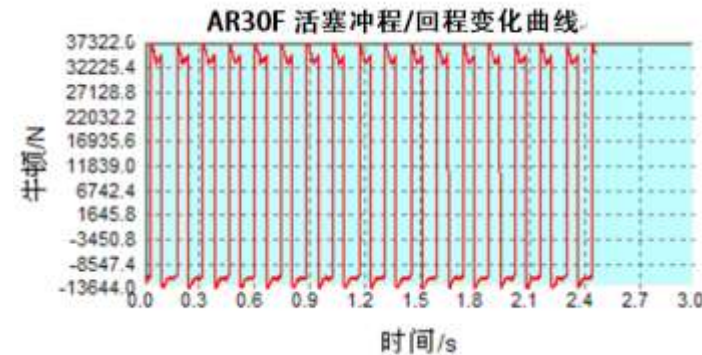
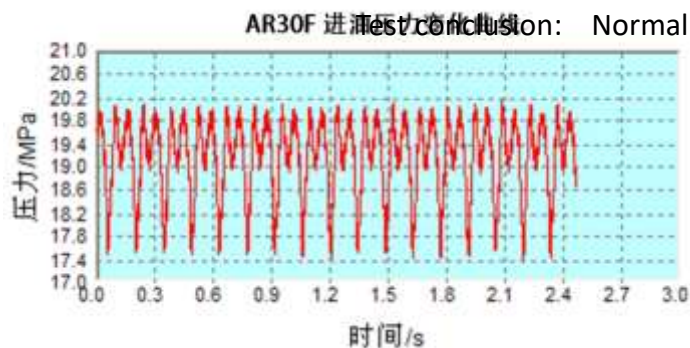
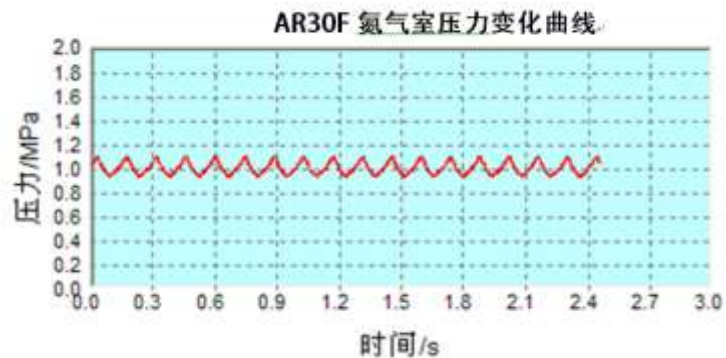
活塞冲击一次能量(The Output Energy of Piston): 5817 J

活塞冲击一分钟频率(Total Impact Times of Within A Minute):800 Times/Min

活塞冲击一分钟能量(The Total Output Energy Within A Minute): 4653600J

测试数据曲线/The Curve graph

测试结论: Normal



Different brand parameters comparison

Type Parameter	AR05F	XXX300	Note	Type Parameter	AR07F	XXX400	Note	Type Parameter	AR12F	XXX450	Note				
Top Type Weight (Kg)	162	180		Top Type Weight (Kg)	264	343		Top Type Weight (Kg)	492	637					
Impact Rate (Bpm)	700-1200	600-1100		Impact Rate (Bpm)	600-1000	500-900		Impact Rate (Bpm)	500-900	400-800					
Impact Energy (J)	500	350		Impact Energy (J)	655	540		Impact Energy (J)	1500	1260					
Empty Hitting or Not	YES	NO		Empty Hitting or Not	YES	NO		Empty Hitting or Not	YES	NO					
Hammer Efficiency (m ³ /hr)	40-90	24-60	Cubic Meter/Shift (8 hours)	Hammer Efficiency (m ³ /hr)	90-150	60-100	Cubic Meter/Shift (8 hours)	Hammer Efficiency (m ³ /hr)	100-130	60-110	Cubic Meter/Shift (8 hours)				
Hose Diameter (In)	G1/2''	G1/2''		Hose Diameter (In)	G1/2''	G1/2''		Hose Diameter (In)	G3/4''	G3/4''					
Rod Diameter (Mm)	53	53		Rod Diameter (Mm)	70	68		Rod Diameter (Mm)	85	85					
Suitable Carrier (Ton)	2.5-4.5	2.5-4.5		Suitable Carrier (Ton)	4-7	4-7		Suitable Carrier (Ton)	7-14	7-11					
Nitrogen Gas Pressure (Bar)	8-12	12-15	ANRV 05F low pressure works fine	Nitrogen Gas Pressure (Bar)	8-12	12-15	ANRV 07F low pressure works fine	Nitrogen Gas Pressure (Bar)	8-12	12-15	ANRV 12F low pressure works fine				
Noise Level (m)	4-8	4-8		Noise Level (m)	4-8	5-10		Noise Level (m)	6-12	6-12					
Working Flow (L/min)	25-50	25-50		Working Flow (L/min)	40-70	40-70		Working Flow (L/min)	60-100	60-100					
Working Pressure (Mpa)	9-12	9-12		Working Pressure (Mpa)	11-14	11-14		Working Pressure (Mpa)	13-16	13-16					
ANRV New industry definition (three guarantees period can be extended to 24 months)	The product combines the advantages of pure hydraulic hammers (such as Atlas) with no need for tightening and high frequency, as well as the high impact force of nitrogen-assisted hydraulic hammers (such as Furukawa). It is suitable for various applications, particularly in secondary crushing in mines, where efficiency can be comparable to that of the Atlas SB202 pure hydraulic hammer. In tunneling and demolition fields, its feature of working without tightening reduces the need for precise positioning by the operator, significantly enhancing operational efficiency. This product is pioneered domestically by Anrui and possesses independent intellectual property rights. Empty hitting: The rod does not need to be tightened to function properly.			ANRV New industry definition (three guarantees period can be extended to 24 months)			The product combines the advantages of pure hydraulic hammers (such as Atlas) with no need for tightening and high frequency, as well as the high impact force of nitrogen-assisted hydraulic hammers (such as Furukawa). It is suitable for various applications, particularly in secondary crushing in mines, where efficiency can be comparable to that of the Atlas SB202 pure hydraulic hammer. In tunneling and demolition fields, its feature of working without tightening reduces the need for precise positioning by the operator, significantly enhancing operational efficiency. This product is pioneered domestically by Anrui and possesses independent intellectual property rights. Empty hitting: The rod does not need to be tightened to function properly.			ANRV New industry definition (three guarantees period can be extended to 24 months)			The product combines the advantages of pure hydraulic hammers (such as Atlas) with no need for tightening and high frequency, as well as the high impact force of nitrogen-assisted hydraulic hammers (such as Furukawa). It is suitable for various applications, particularly in secondary crushing in mines, where efficiency can be comparable to that of the Atlas SB202 pure hydraulic hammer. In tunneling and demolition fields, its feature of working without tightening reduces the need for precise positioning by the operator, significantly enhancing operational efficiency. This product is pioneered domestically by Anrui and possesses independent intellectual property rights. Empty hitting: The rod does not need to be tightened to function properly.		

Different brand parameters comparison

Type Parameter	AR15F	XXX800	备注
Top Type Weight (Kg)	764	866	
Impact Rate (Bpm)	500-850	350-700	
Impact Energy (J)	2300	1960	
Empty Hitting or Not	YES	NO	
Hammer Efficiency (m ³ /hr)	180-280	90-200	Cubic Meter/Shift (8 hours)
Hose Diameter (In)	G3/4''	G3/4''	
Rod Diameter (Mm)	100	100	
Suitable Carrier (Ton)	10-16	10-14	
Nitrogen Gas Pressure (Bar)	15-18	14-17	ANRV 15F low pressure works fine
Noise Level (m)	7-14	7-14	
Working Flow (L/min)	80-110	80-110	
Working Pressure (Mpa)	15-17	15-17	
ANRV New industry definition (three guarantees period can be extended to 24 months)	The product combines the advantages of pure hydraulic hammers (such as Atlas) with no need for tightening and high frequency, as well as the high impact force of nitrogen-assisted hydraulic hammers (such as Furukawa). It is suitable for various applications, particularly in secondary crushing in mines, where efficiency can be comparable to that of the Atlas SB202 pure hydraulic hammer. In tunneling and demolition fields, its feature of working without tightening reduces the need for precise positioning by the operator, significantly enhancing operational efficiency. This product is pioneered domestically by Anrui and possesses independent intellectual property rights. Empty hitting: The rod does not need to be tightened to function properly.		

Type Parameter	AR30F	XXX2200	备注
Top Type Weight (Kg)	2100	2059	
Impact Rate (Bpm)	400-600	350-500	
Impact Rate (Bpm)	700-1000	-	In confluence mode
Impact Energy (J)	5817	3580	
Empty Hitting or Not	YES	NO	
Hammer Efficiency (m ³ /hr)	350-600	220-450	Cubic Meter/Shift (8 hours)
Accumulator Pressure (Bar)	55-60	No Accumulator	
Hose Diameter (In)	G1''	G1''	
Rod Diameter (Mm)	140	140	
Suitable Carrier (Ton)	18-26	18-26	
Nitrogen Gas Pressure (Bar)	15-18	12-17	ANRV 30F low pressure works fine
Noise Level (m)	13-18	16-22	
Working Flow (L/min)	180-200	120-180	
Working Pressure (Mpa)	18-20	16-18	
ANRV New industry definition (three guarantees period can be extended to 24 months)	The product combines the advantages of pure hydraulic hammers (such as Atlas) with no need for tightening and high frequency, as well as the high impact force of nitrogen-assisted hydraulic hammers (such as Furukawa). It is suitable for various applications, particularly in secondary crushing in mines, where efficiency can be comparable to that of the Atlas SB202 pure hydraulic hammer. In tunneling and demolition fields, its feature of working without tightening reduces the need for precise positioning by the operator, significantly enhancing operational efficiency. This product is pioneered domestically by Anrui and possesses independent intellectual property rights. Empty hitting: The rod does not need to be tightened to function properly.		

Field test report

1. Test Product Information:

Product Name: Anrv Hydraulic Inflating Hammer
Model: AR30F
Rod Diameter: $\Phi 145\text{mm}$
Product Weight: 1991kg
Nitrogen Pressure: 12-17bar
Accumulator Pressure: 55-60bar

2. Test Content:

Comparison of AR30F with Ordinary Nitrogen 140 Hammer:

- 1) Workload
- 2) Frequency
- 3) Ability to work without tightening
- 4) Product application crushing response speed

3. Test Environment:

- 1) Testing Unit: Xiamen Henglixing Engineering Machinery Co., Ltd.
- 2) Host Model: Hitachi ZX240 (Internal Confluence) with 8000 hours of operation
- 3) Application Scenario: Concrete crushing on the island of Xiamen City
- 4) Personnel in Charge: Minister Wang from Xiamen Henglixing



1) Before the excavator's confluence, the pressure is 22MPa, and the nitrogen pressure is 1.8MPa (as shown in the diagram below).



Field test report

2) After the excavator's confluence, the pressure is 26.3MPa, and the nitrogen pressure is 1.8MPa (as shown in the diagram below).

P mode Low speed

P mode High speed



3) Data on flows

E mode Low speed

E mode High speed



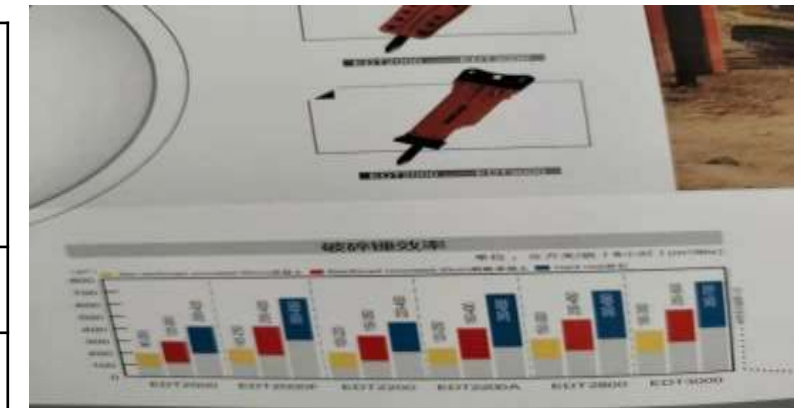
Field test results

1. Comparison of Workload: Efficiency comparison chart between a domestic brand operating for 8 hours and the Anrv AR30F.
2. Product Crushing Response Speed:
Single response time: 0.075 seconds, measured using the DecibelX software.
3. Evaluation of Product and Host after 350 Hours of AR30F Operation:
 - 1) The host machine did not experience any derivative faults caused by the operation of the hydraulic hammer.
 - 2) No faults were found in the hydraulic hammer after disassembly.

Products	Pressure (mpa)	Flow (l/min)	Nitrogen pressure (bar)	Frequency (bpm)
AR30F	22	160	17	850
Domestic brand	22	160	17	450



	Pressure (mpa)	Flow (l/min)	Nitrogen pressure (bar)	Reinforced concrete operation (8 hours cubic)
AR30F	22	160	17	350
Domestic brand	22	160	20	200



**Live
video**

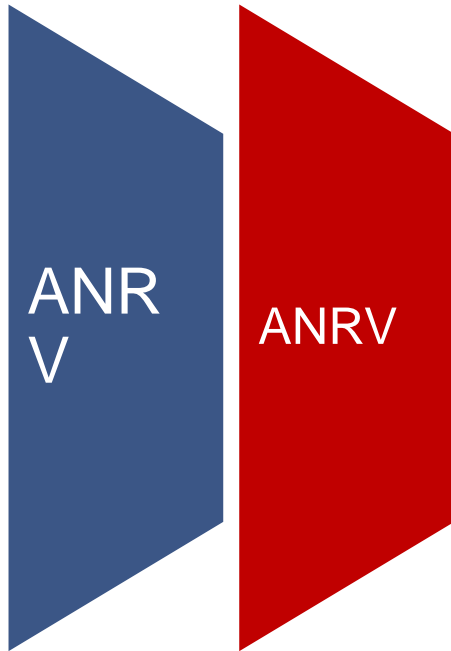


Field Case (Ordinary hydraulic hammer)

Luliang City is located in the northwest of Shanxi Province and boasts rich mineral resources. Within its borders, there are more than ten types of mineral resources, including coal mines, bauxite, and iron mines, with proven reserves ranking among the top in the province. Currently, the site where the user's crushing hammer is used is located in Lishi District and Liulin County, among more than ten bauxite mines under the jurisdiction of Luliang City, Shanxi Province. Operations are conducted in underground tunnels ranging from 100 meters to 2000 meters deep. Due to recent restrictions on explosives, excavation is carried out using track-mounted electric excavators paired with hydraulic hammers for crushing. The daily excavation progress is around 12 meters, with underground tunnels measuring 2.6 meters in height and 2.8 meters in width.

1. Long Continuous Operation Time (generally around 15 hours, with some equipment operating 24 hours a day).
2. Hard stones, making crushing difficult.
3. Limited workspace, making it difficult for large hammers to enter the pit. The largest hammer that can be used is the 20F (with a rod diameter of 127mm) hammer for crushing work.
4. Forward flat striking causes rapid wear of the inner and outer sleeves of the hammer, leading to cylinder pulling.
5. The work environment has high dust levels and low visibility, making it easy for the hydraulic system and hammer body to become dirty. Operators easily experience fatigue.





1 Scaling tunnel-specific hammer

Small in size, lightweight, high frequency, starts working with oil, no need to tighten the boom and arm, reducing the driver's search for breaking points. The 03F Anrui pure explosive hammer with a rod diameter of 45 surpasses the striking force of ordinary hydraulic hammers with a rod diameter of 53, achieving twice the result with half the effort. At the same time, it can greatly reduce the lifting weight of the pry-bar trolley and increase the lifespan of the vehicle structure components. Professionally designed for empty hitting, oblique hitting, and flat hitting, which do not affect the lifespan of the hydraulic hammer, making it more convenient for operators. Specially customized material structure can withstand moisture and rain erosion in tunnels, making the hydraulic hammer more reliable.

2 Special hammer for metallurgical furnace

Small in size, lightweight, high frequency, starts working with oil, no need to tighten the boom and arm, reducing the driver's search for breaking points. It can hitting empty, obliquely, and flatly without damaging the furnace body in converters, torpedo tanks, and cement kilns, truly achieving twice the result with half the effort.



New

Invention

Lightweight hammer is no need to give pressure on objects, easy work for driver who do not need to find a spot.

Wild range of applications

Suitable for special working conditions in the construction demolition industry, tunnel excavation, furnace and kiln refractory brick removal, metallurgical industry, etc.

Low failure rate

Low failure: high crushing efficiency, reduce the hammer continuous working time, greatly reduce the failure rate of the hammer.



Lower investment

The cylinder body features a unique design with an integrated reversing valve, providing sensitive responsiveness. Its price is significantly lower than that of pure hydraulic hammers, resulting in greatly reduced usage costs. For example, the 30F model (with a rod diameter of 145mm) offers efficiency comparable to hydraulic hammers with rod diameters of $\phi 155\text{mm}/175\text{mm}$, thus reducing the investment cost for excavators.

Modern technology

Scientific weight reduction, volume reduction, and increased power, along with a sleek circular design, tailored for various application scenarios.

New material

Customized materials to enhance product lifespan.

Showcasing the customer base

The domestic adoption rate of electric excavators for slag scraping in shafts and tunnels exceeds 95%, with an annual matching quantity of around 1000 units. Additionally, the demand for products replacing explosives for shaft and tunnel excavation has been increasing year by year.

型号	功率 (kW)	重量 (kg)	最大挖掘力 (kN)	最大挖掘速度 (m/min)
PC100LC-6	100	10000	100	1.0
PC120LC-6	120	12000	120	1.2
PC135LC-6	135	13500	135	1.3
PC150LC-6	150	15000	150	1.5
PC160LC-6	160	16000	160	1.6
PC175LC-6	175	17500	175	1.7
PC180LC-6	180	18000	180	1.8
PC195LC-6	195	19500	195	1.9
PC200LC-6	200	20000	200	2.0

The domestic piling machine industry has a matching rate of over 95%.



The smallest and lightest handheld and mounted pile drivers in China, with a market presence in North America and Europe reaching 3000 units.



Hitachi Construction Machinery's qualified domestic partners.



Drilling rig power head, such as Shanghai Jierang.



THANKS



www.anrvchina.com