



# HYDRAULIC IMPACT HAMMER OWNER'S MANUAL

DEEP FOUNDATION  
SOLUTIONS



**800-248-8498**

[WWW.AMERICANPILEDIVING.COM](http://WWW.AMERICANPILEDIVING.COM)

**MODEL 10-4 HIH**

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# Quick Reference Guide

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This Quick Reference Guide will assist you in finding the information you're looking for.

**GENERAL INFORMATION**

**MAINTENANCE & TROUBLESHOOTING**

**REPLACEMENT PARTS**

**REFERENCE / NOTES**

A Table of Contents is included after the Foreword.

**Description:**

**MODEL 10-4 Hydraulic Impact Hammer**

*Page 1*





# WARRANTY INFORMATION



American Piledriving Equipment, Inc. (APE) warrants new products sold by it to be free from defects in material or workmanship for a period of one (1) years after the date of delivery to the first user and subject to the following conditions:

- APE's obligation and liability under this WARRANTY is expressly limited to repairing or replacing, at APE's option, any parts which appear to APE upon inspection to have been defective in material or workmanship. Such parts shall be provided at no cost to the user, at the business establishment of APE or the authorized APE distributor of the product during regular working hours.
- This WARRANTY shall not apply to component parts or accessories of products not manufactured by APE, and which carry the warranty of the manufacturer thereof, or to normal maintenance (such as engine tune-up) or normal maintenance parts (such as filters).
- Replacement or repair parts installed in the product covered by this WARRANTY are warranted only for the remainder of the warranty as if such parts were original components of said product.
- APE makes no other warranty, expressed or implied, and makes no warranty of merchantability of fitness for any particular purpose.
- APE's obligations under this WARRANTY shall not include any transportation charges, costs of installation, duty, taxes or any other charges whatsoever, or any liability for direct, indirect, incidental or consequential damage or delay.
- If requested by APE, products or parts for which a warranty claim is made are to be returned, transportation prepaid, to APE.

OIL MUST MEET ISO CLEANLINESS CODE 17/15/11.  
OIL THAT DOES NOT MEET CLEANLINESS CODE WILL  
**VOID** THE WARRANTY

ANY IMPROPER USE, INCLUDING OPERATION AFTER DISCOVERY OF DEFECTIVE OR WORN PARTS, OPERATION BEYOND RATED CAPACITY, SUBSTITUTION OF ANY PARTS WHATSOEVER, USE OF PARTS NOT APPROVED BY APE OR ANY ALTERATION OR REPAIR BY OTHERS IN SUCH A MANNER AS, IN APE'S JUDGMENT, AFFECTS THE PRODUCT MATERIALLY AND ADVERSELY, SHALL  
**VOID** THIS WARRANTY.

ANY TYPE OF WELDING ON APE'S EQUIPMENT WILL  
**VOID** THE WARRANTY UNLESS AUTHORIZED IN WRITING BY APE

NO EMPLOYEE AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR GRANT ANY OTHER WARRANTY UNLESS SUCH CHANGE IS MADE IN WRITING AND SIGNED BY AN OFFICER OF APE, INC.



(These precautions must be followed at all times to ensure personal and equipment safety.)



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a hazardous situation where injury could occur but is unlikely to be serious or lead to death.



NOTICE indicates information that may help or guide you in the operation or service of the equipment.

## DISCLAIMER

This unit was tested and flushed before leaving our facility. In order to help provide years of trouble free usage, please review the following documentation and make sure to clean and flush the field piping before connecting it to the power unit.

Refer to schematic diagrams and the BOM (Bill of Materials) for component part specifications and recommended spare parts.

When calling APE (American Piledriving Equipment), always inform them of the supplied serial # in order to obtain quicker service.



**READ THIS MANUAL THOROUGHLY BEFORE OPERATING AND / OR WORKING ON THE EQUIPMENT.**

1. Read and follow any safety instructions in the Excavator operators manual.
2. Only well-trained and experienced personnel should operate or maintain this equipment.
3. Do **NOT** adjust, lubricate or repair the unit when it is in operation or lifted above ground level.
4. Do **NOT** remove, paint over and/or cover warning or safety labels. If labels become damaged or unreadable, replace immediately.
5. All personnel should wear approved safety clothing, including **HARD HATS, SAFETY SHOES, SAFETY GLASSES** and **HEARING PROTECTION** when near this equipment.
6. Do **NOT** stand close to this equipment when it is in operation. Dirt and parts may fall. **NEVER** stand under operating or elevated equipment. Keep your eyes on the hammer while it is in operation.
7. When maintaining and/or repairing the equipment, **NEVER** substitute parts not supplied or approved in writing by APE.



## **Do NOT WELD OR FLAME CUT ON THIS EQUIPMENT.**

8. Do **NOT** use or store flammable liquids on or near the engine.
9. Ensure that all lifting equipment, including cranes, wire rope, slings, hooks, shackles, etc., are properly sized for the worst case loads anticipated during operations.
10. If there are any questions about the weights, specifications or performance of the unit, contact APE before handling and/or operating the equipment.
11. Check wire rope clips for tightness and wire ropes for wear daily.



**WHEN OPERATING IN AN ENCLOSED AREA, EXHAUST FUMES SHOULD BE PIPED OUTSIDE. CONTINUED BREATHING OF EXHAUST FUMES MAY PROVE FATAL.**

(These precautions must be followed at all times to ensure personal and equipment safety.)

12. Ensure that ground vibrations will not damage or collapse adjacent structures or excavations.
13. Remove all tools, parts and electrical cords before starting the unit.
14. Do **NOT** smoke or use an open flame while servicing batteries. Batteries generate explosive gas during charging. Keep the area ventilated.
15. When filling the fuel tank do **NOT** smoke or use an open flame in the vicinity.
16. If abnormal equipment operation is observed, stop use immediately and correct the problem.
17. Store oily rags in approved containers and away from the engine exhaust system.
18. Do **NOT** adjust the hydraulic pressures higher or lower than those specified in this manual.
19. Do **NOT** operate this equipment with hydraulic hoses that are damaged or 'kinked'. Replace damaged hoses immediately.
20. Do **NOT** support hydraulic hoses with wire rope.
21. Do **NOT** allow hydraulic hoses to snag during movement of the unit.
22. Do **NOT** pull on and/or attempt to move equipment with the hydraulic hoses.
23. Do **NOT** attempt to locate hydraulic leaks with your hands. High-pressure leaks can penetrate skin and cause severe damage, blood poisoning, and/or infection.
24. Do **NOT** attempt to repair leaks while the equipment is in operation.
25. Do **NOT** attempt to tighten and/or loosen fittings and/or hoses when the machine is in operation.
26. When moving and/or transporting this equipment, insure that the vehicle or vessel is of sufficient capacity to handle the load. Make sure that the equipment is properly tied down.
27. When moving this equipment be sure that the QD Dust Caps are tight and that the cap safety cables are in place. Be sure that all equipment parts are tight and properly secured before shipment. Unsecured parts may vibrate loose and fall causing injury and/or property damage.
28. Rounded and/or damaged bolt heads and nuts should be replaced. Proper torque values are necessary to prevent parts on this equipment, leads, and crane booms from loosening and falling. Refer to the torque chart in this manual.
29. Keep limbs and tools clear of the clamp jaws.

## NOTICE

**A PROPERLY MAINTAINED FIRE EXTINGUISHER, SUITABLE FOR OIL FIRES, MUST BE KEPT IN THE IMMEDIATE VICINITY OF OPERATIONS.**

30. Do **NOT** allow clothing, hoses, ropes, etc., to become entangled in moving components, including the clamp and suppressor.
31. Keep excavator, piles, vibrator, wire rope, and other equipment at least 15 feet (5 meters) from electrical power lines, transformers, and other electrical equipment, or at such distance as required by applicable safety codes.
32. Never disconnect the excavator and vibrator while the vibrator is on pile. Loss of hydraulic pressure will cause vibrator to fall. Lay vibrator down when not in use.
33. When extracting piles always attach a safety line between the pile and the excavator.
34. When extracting piles, check excavator load/radius tables to be sure capacity is adequate for maximum allowable extraction pull.
35. When extracting or driving piles always be sure that the excavator bucket pivot pin is aligned with the centerline of the pile. Do not side load the vibrator. Vibrator damage will result.
36. When extracting piles, do not exceed the capacity of the vibrator suppressor.
37. Check vibrator suppressor for broken or damaged elastomers daily. Do not operator vibrator with damaged elastomers.
38. Always start both driving and extraction of piles in an unloaded condition.
39. Do **NOT** run the vibrator without clamp jaws closed.
40. Guide the vibrator with a tag line when possible.



**DO NOT ATTEMPT TO LIFT OR WALK WITH PILES EXCEEDING 10 TONS WEIGHT.**



**KEEP HANDS, FEET, AND/OR TOOLS WELL CLEAR OF ALL CLAMP JAWS AND SUPPRESSOR ELASTOMERS.**



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(These precautions must be followed at all times to ensure personal and equipment safety.)

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## NOTICE

**CHECK THE ENTIRE UNIT PRIOR TO AND DURING SET-UP  
EACH DAY OR AT THE BEGINNING OF EACH SHIFT**

Prior to starting the unit or at the beginning of each shift, check the following:

- Visually inspect all bolts, nuts and screws.
- Visually inspect all suppressor elastomers.
- Tighten bolts holding gripping jaws to the hydraulic clamp.
- Check the oil level in the vibration case and add oil if required. The oil level should be in the middle of the sight glass. Change oil if it is milky or contaminated.
- \* **DO NOT OVERFILL.**
- Visually inspect all hydraulic fittings for leaks. If a leak is found or suspected, shutdown the power unit. If a fitting appears to be damaged replace it with a new fitting.
- Check the hydraulic motor and hydraulic manifold for leaks.

## NOTICE

**IT IS ABSOLUTELY IMPERATIVE THAT NO DIRT OR OTHER IMPURITIES BE PERMITTED  
TO CONTAMINATE THE HYDRAULIC FLUID. ANY CONTAMINATION WILL DRASTICALLY  
SHORTEN THE LIFE OF THE HIGH-PRESSURE HYDRAULIC SYSTEM.**

**VIBRATION LOOSENS BOLTS. CHECK THEM THOROUGHLY.**



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# Foreword

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This manual covers the APE 10-4 Hydraulic Impact Hammer installation, maintenance and use.

The data provided in this manual gives the necessary information to operate and maintain APE equipment. The listed procedures are to be performed by qualified personnel who have an understanding of the equipment and who follow all safety precautions.

All information given in this manual is current and valid according to the information available at the time of publication. American Piledriving Equipment, Inc. Reserves the rights to implement changes without prior notice.

## Using this manual:

- Refer to the Table of Contents for the page location of applicable sections.
- All weights and measurements are in English and Metric units.
- Any revisions to this manual will appear on the Revision Record page at the back of this manual.
- Please visit [www.americanpiledriving.com](http://www.americanpiledriving.com) for product data sheets and manual.

## **DISCLAIMER:**

This unit was tested and flushed before leaving our facility. In order to help provide years of trouble-free usage, please review the following documentation and make sure to clean and flush the quick disconnect fitting on any equipment before connecting it to the power unit.

Refer to schematic diagrams and the BOM (Bill of Materials) for component part specifications and recommended spare parts.

When calling APE, always have the equipment serial number on hand in order to obtain quicker service.

## **COMMON ABBREVIATIONS AND TERMS**

**APE** : American Piledriving Equipment  
**Vibro** : Vibrator  
**QD** : Quick Disconnect  
**HCLW** : High Collar Lock Washer  
**SHCS** : Socket Head Cap Screw  
**BOM** : Bill of Materials  
**P.O.** : Pilot Operated  
**Lbs** : Pounds  
**in** : Inches  
**Psi** : pound per Square Inch  
**Mm** : Millimeters

**Cm** : Centimeters  
**M** : Meters  
**Kg** : Kilogram  
**kN** : Kilo-newton  
**Rpm** : Revolutions per Minute  
**Vpm** : Vibrations per Minute  
**Cyl** : Cylinder  
**Eng** : Engine  
**Mtg** : Mounting  
**Sol** : Solenoid  
**S/N** : Serial Number

### **CALIFORNIA**

#### **Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

### **CALIFORNIA**

#### **Proposition 65 Warning**

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer, birth defects and reproductive harm. **Wash hands after handling.**



# Tables of Contents

WARRANTY INFORMATION	2
SAFETY WARNING INFORMATION	3
FOREWORD	6
TABLE OF CONTENTS	7
10-4 HYDRAULIC IMPACT HAMMER SPECIFICATIONS	7
SAFETY / WARNING LABELS	8
HYDRAULIC IMPACT HAMMER OVERVIEW	9
HYDRAULIC IMPACT HAMMER EQUIPMENT INFORMATION	9
HYDRAULIC IMPACT HAMMER FEATURES	11
CONNECTING THE HYDRAULIC HOSES	12
OPERATION INFORMATION	13
HAMMER CONTROLS	14
REPLACEMENT PARTS	16
CAGE ASSEMBLY	19
ROD-PISTON ASSEMBLY	23
CYLINDER HEAD GLAND ASSEMBLY	24
HOSE BRACKET ASSEMBLY	25
MAINTENANCE	26
PILE BEARING CHART	28
REFERENCE / NOTES	29
BOLT REFERENCE	31

## 10-4 HYDRAULIC IMPACT HAMMER SPECIFICATIONS

### DIMENSIONS

Overall Length	93.88 in	(238.45 cm)
Overall Width	22 in	(56 cm)
Overall Height	71.40 in	(181.36 cm)

### SPECIFICATIONS

Ram Weight	20,000 lbs	(9,071.85 kg)
Rated Energy	80,000 ft-lbs	(108.47 kNm)
Stroke at Rated Energy	48 in.	(121.92 cm)
Blows Per Minute	30 - 65 / Min - Max	
Weight Without Insert	30,000 lbs	(13,607.77 kg)
Standard Lead Size	8" x 26"	

#### *Smaller Ram Options available*

	RAM WEIGHT	MAX STROKE	MIN STROKE	MAX STROKE RATED ENERGY	BLOW RATE	WEIGHT W/O INSERT	HEIGHT	STANDARD LEAD SIZE	HYDRAULIC HOSE LENGTH
6-4	12,000 lbs	48 in	4 in	48,000 ft-lb	30-64 per min	19,500 lb	144 in	8" x 26" Box	150 ft
7-4	14,000 lbs	48 in	4 in	56,000 ft-lb	30-64 per min	21,500 lb	144 in	8" x 26" Box	150 ft
8-4	16,000 lbs	48 in	4 in	64,000 ft-lb	30-64 per min	23,800 lb	144 in	8" x 26" Box	150 ft



## GENERAL INFORMATION

### SAFETY / WARNING LABELS



This plate contains numbers key to identifying the unit. This information is important when contacting APE for replacement parts or repair instructions.



Do not use the vibro as a lifting device. The clamp may lose pressure and drop the load, causing property damage, serious injury, or death.



Do not weld on or around the equipment unless authorized in writing by APE. Doing so will void all warranties and may cause damage to the equipment.

# Hydraulic Impact Hammer Equipment Information

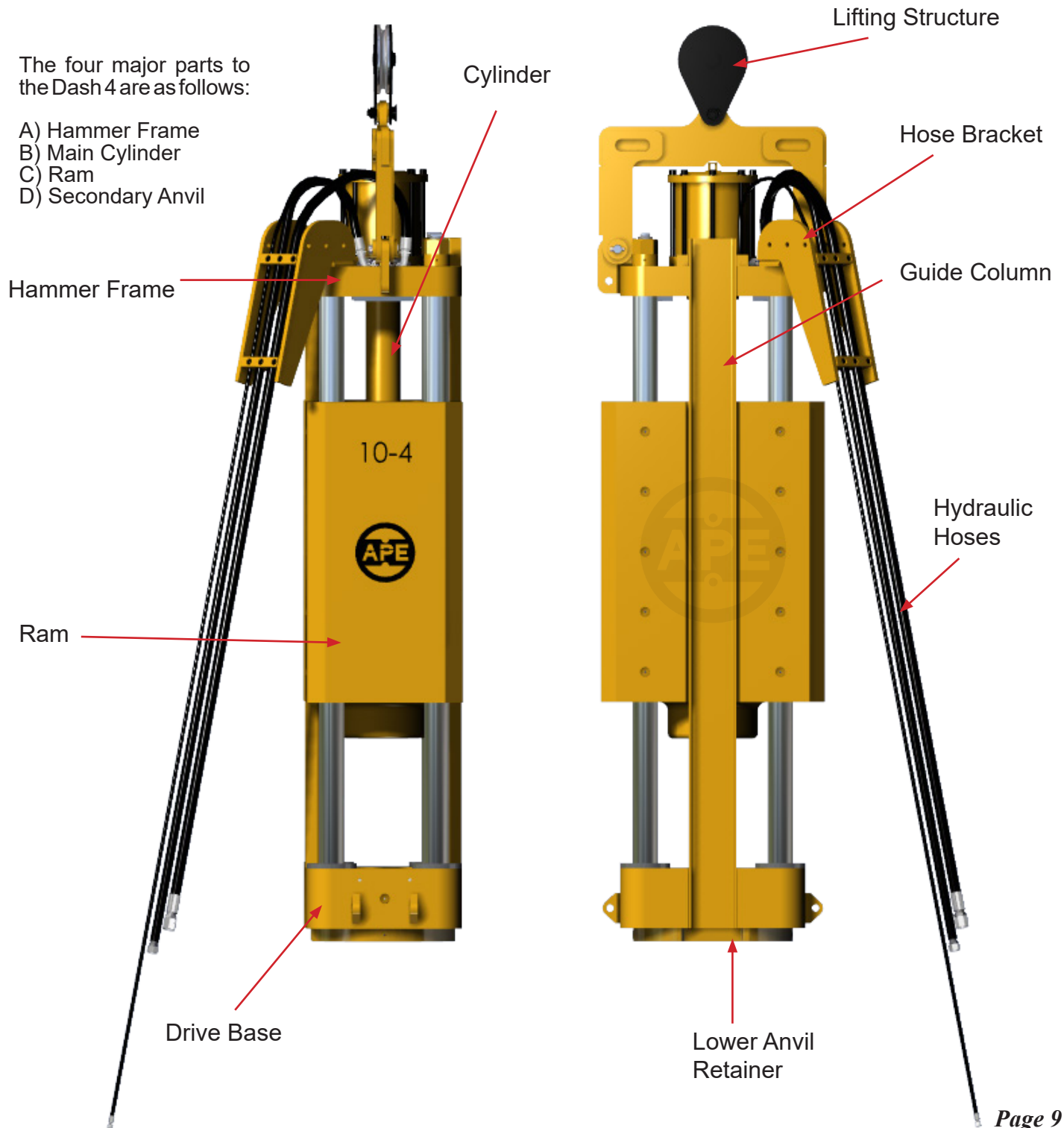
## HYDRAULIC IMPACT HAMMER OVERVIEW

The APE Dash 4 is a variable stroke, hydraulically-operated and controlled pile driver. In addition, the hammer can be used for soil compaction, installing well casings and testing piers.

The Dash 4 operates in a range of approximately 30 to 65 cycles per minute depending on the hydraulic flow and desired stroke.

The four major parts to the Dash 4 are as follows:

- A) Hammer Frame
- B) Main Cylinder
- C) Ram
- D) Secondary Anvil



GENERAL INFORMATION



# Hydraulic Impact Hammer Checklist

## IMPACT HAMMER CHECKLIST PRIOR TO SHIPMENT



### APE HYDRAULIC IMPACT HAMMER INSPECTION / TEST SHEET



MUST BE COMPLETED & SIGNED PRIOR TO SHIPMENT

Date: \_\_\_\_\_ Job / Sales Order No.: \_\_\_\_\_ Equipment No.: \_\_\_\_\_ Serial No.: \_\_\_\_\_  
 HIH Model: \_\_\_\_\_ Inspector : \_\_\_\_\_ Customer: \_\_\_\_\_

- Removed All Wire Rope for Insurances Reasons .....
- Checked All Bolts on Lead Guide Rails .....
- Inspected All Wire Rope Nuts.....
- Inspected Ram for Cracks.....
- Inspected Lead Guide Rails and Welds for Cracks.....
- Inspected all Hoses and Fittings on Cyl. Manifold.....
- Checked Retainer Ring Bolts.....
- Checked the Striker Plate.....
- Checked Ram Connection Bolts .....
- Removed Any Welding Attached by Customer .....
- Serial Number Stamped/Welded On.....
- Check and Cleaned Quick Disconnects .....
- Checked Caps and Plugs.....
- Checked O-Ring on QDs .....
- Put Spare O-Ring Kit in Tool Box of Power Unit .....
- Drive Pressure: \_\_\_\_\_
- Cycles Per Minute: \_\_\_\_\_
- Temperature Of Hydraulic Oil at Time of Test \_\_\_\_\_

#### NOTES

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

#### LOADING EQUIPMENT CHECK LIST

Prior to the equipment going out on rent it must look like new condition. If the paint appears bad then paint it. If the paint surface is bad then have it sand blasted. Do not allow the equipment to go out looking bad. Any bad hoses should be replaced. The most important thing is the condition of the hoses. Should be new or in new condition.

#### COLD WEATHER

If this unit is going to operate in cold weather then please make sure the proper oils have been used. In cold weather operations, we must use a softer o-ring to handle the colder temperatures.

Inspector Signature: \_\_\_\_\_

Date: \_\_\_\_\_

GENERAL INFORMATION



# Hydraulic Impact Hammer Features

Swivel Mount hydraulic hose gang clamp enables you to pivot the hoses to the desire location to keep them out of the way of piledriving operations

Wireless pendant control operates off power units

Easily adapts to fork lift or crane operation

Can operate with 26" drive base and any insert to fit your pile size

Lifting structure designed for easy lifting

Heavy wear brass bushings for batter pile operations

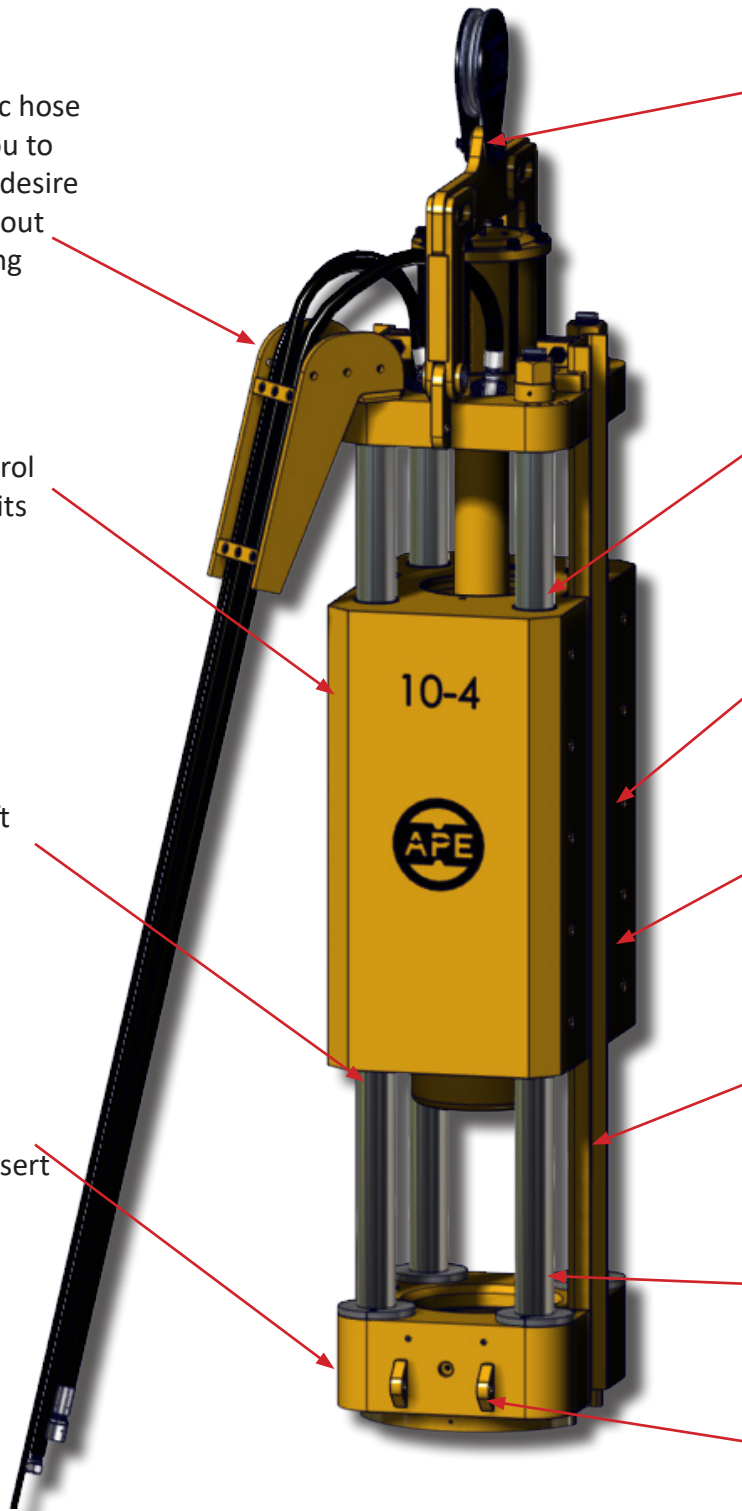
Ram Weight Ranges from 8,000 to 20,000 lbs.

One Piece forged Steel Ram

Fits in 26"x8" box leads. Easily adapts to larger lead sizes

Hollow columns for pre-stressed cable design.

Cable Pad eyes to lash up drive base and insert



# Understanding Hydraulics

## CONNECTING THE HYDRAULIC HOSES

Before connecting the hoses to the power unit ensure that the power unit is powered off. The quick disconnect couplers must be clean and free on any dirt or contaminants. Clean the quick disconnect couplers with brake wash if necessary.

The hydraulic impact hammer is usually shipped with the hoses attached to the hammer. If the hoses have been shipped separately, they must be connected as shown.

There are three hoses leading from the hammer that must be connected to the power unit to begin operation. The hoses attach to the power unit by screwing the quick disconnect couplers onto the proper couplers of the power unit. The couplers on the power unit are mated with the couplers on the hammer, so there is no chance of putting them on backwards.



## Attention!

Pressurizing the system while there is air entrained in the fluid may cause damage to the components.

Let the system run at idle for an additional 10 minutes to allow the air to rise into the airspace of the hydraulic reservoir.

## Attention!

Connecting the hoses is one of the most critical aspects of commissioning an APE equipment. Take extreme care to keep these connections absolutely clean. This procedure is one of the most common ways for foreign particles to be introduced into a hydraulic system.

***New hydraulic fluid is NOT clean oil!***

***Oil must meet ISO cleanliness code  
17/15/11***



# Operation Information

## WARM UP PROCEDURE

Before operation it is necessary to bring the power units hydraulic oil to a working temperature of 80°F. To start and warm up the power unit follow the steps below.

1. On the main control panel turn main power switch to the on position.
2. Press and hold engine start/stop button until engine in running. This should only take a few seconds.
3. Idle power unit in drive until oil temp is above 80°F before doing hard work. Failing to do so may cause seal failures, leaks and excessive pressures through the hydraulic system.



## OPERATING TEMPERATURES

The Operating Temperature references the internal temperature of the motor. Take into consideration the following requirements:

- 21°C (70°F) – Operate the Vibro at reduced speed while below this temperature
- 27°C (80°F) – Ideal working temperature.
- 70°C (158°F) – Avoid going over this Operating Temperature for improved service life
- 85°C (185°F) – Highest permissible intermittent Operating Temperature
- -35°C (-31°F) – Lowest permissible Operating Temperature
- 60°C (140°F) – Temperature difference between the motor and the hydraulic fluid

The Operating Temperature may be measured from the hydraulic fluid returning from the motor. Case drain fluid temperature will also have an effect.



# Hammer Controls

## WIRELESS PENDANT IF EQUIPPED

### KEY FEATURES

- Wireless Remote
- USB Magnetic Charging Dock
- Range Distance up to 600'
- Rugged Heavy Duty
- Ergonomic Handheld
- Waterproof
- Shockproof
- High-Impact Rated
- Engine Display
- Hydraulic Display
- Extended Battery Life

### GOVERNOR

#### ENGINE RPM DOWN

Press to decrease RPM by increments of 50 RPM. Hold for Min RPM.

### DRIVE STOP

Press DRIVE STOP button to ENGAGE (AUTO MODE)

### STROKE DECREASE

Press STROKE DOWN button to decrease stroke time (AUTO MODE)

### DWELL DECREASE

Press DWELL DOWN button to decrease dwell time (AUTO MODE)

### AUTO/MANUAL

Press AUTO / MANUAL button to toggle between modes.

#### ENABLE BUTTON REQUIRED

BLUE LED = AUTO MODE ACTIVE

## ATTENTION

### ENABLE BUTTON

Must be depressed to activate a function:

- ENGINE START
- DRIVE START
- AUTO / MANUAL

#### AUTO MODE:

1. Press Enable button + Drive Start button = Starts hydraulic flow to the HIH Manifold (nothing moves)
2. Press Enable button + Drive Start button = HIH enters cycle mode. (Stroke and Dwell is active)

#### MANUAL MODE:

1. Press Enable button + Drive Start button = Starts hydraulic flow to the HIH Manifold (nothing moves)
2. Press Enable button + Drive Start button = Hammer lifts while holding.
3. Release Drive Start button to let hammer fall. (Stroke and Dwell is not active)

## POWER / EMERGENCY STOP

## ATTENTION:

WILL SHUT OFF  
ENGINE, DISENGAGE  
DRIVE AND ALL  
VALVES INSTANTLY.  
Control panel will stay on.



### GOVERNOR

#### ENGINE RPM UP

Press to increase RPM by increments of 50 RPM. Hold for Max RPM

### DRIVE START

Press DRIVE START button to ENGAGE  
**ENABLE BUTTON REQUIRED**

### STROKE INCREASE

Press STROKE UP button to increase stroke time (AUTO MODE)

### DWELL INCREASE

Press DWELL UP button to increase dwell time (AUTO MODE)

### ENGINE

#### START/STOP

##### START

Press Engine Start button to start

**ENABLE BUTTON IS REQUIRED**

##### STOP

Press Engine Stop button to shut down the engine

NOTE: "WHILE DRIVING" If remote is out of range, Drive will go into neutral, Engine rpm will decrease to idle, and if clamp is active, clamp will stay closed.

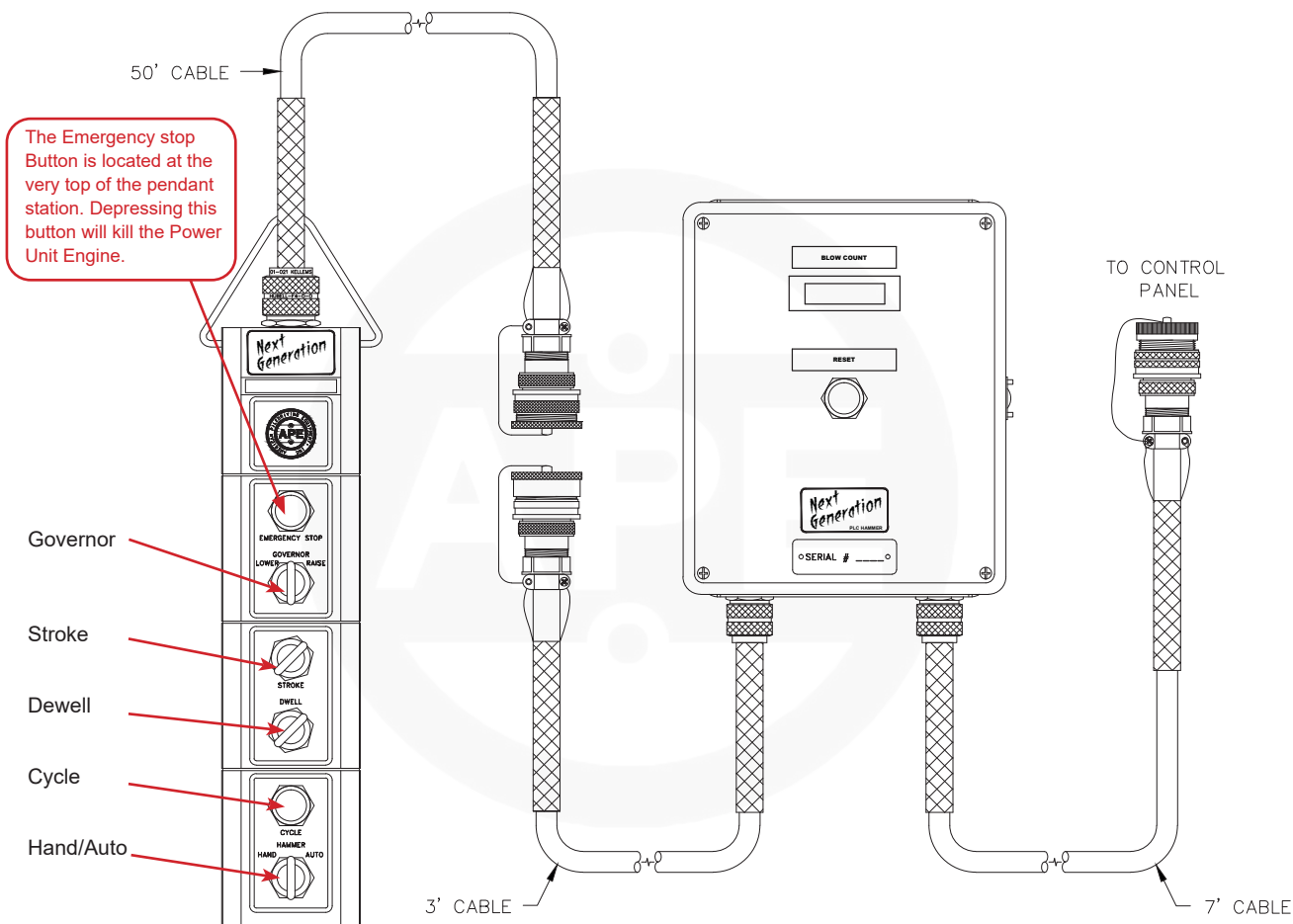


# Hammer Controls

## WIRED PENDANT IF EQUIPPED

The hammer control consists of a Blow Count Box and a Pendant, connected via a multi conductor cable. The Blow Count Box should be mounted to the Power Unit just below the Control Panel. The Blow count box is connected to the Control Panel via an Amphenol Plug.

- Emergency Stop Button:** The Emergency stop Button is located at the very top of the pendant station. Depressing this button will kill the Power Unit Engine.
- Governor Switch:** Turn this switch to the left "Lower" Engine RPM. Turn the switch to the right "Raise" Engine RPM.  
*Note: If the engine rpm is increased while the hammer is operating, the stroke will increase.*
- Stroke Switch:** This switch is the primary control, regulating the time of the ram stroke. Turning the switch all the way to the "Left" (approx 7 o'clock) will produce the shortest stroke. Turning the switch all the way to the "Right" (approx 5 o'clock) will produce the longest stroke. Until the operator is really familiar with the hammer's operational characteristics, the hammer should be started with a short stroke setting, then increased after the hammer is operating.  
*Note: If the engine rpm is increased while the hammer is operating, the stroke will increase.*  
*Note: The setting for a 4 ft drop, should be about .55 seconds.*
- Dwell Timer Switch:** It's function is to regulate dwell time between ram impact and the beginning of the next lift cycle. Turning the switch all the way to the "Left" (approx 7 o'clock) will produce the shortest dwell. Turning the switch all the way to the "Right" (approx 5 o'clock) will produce the longest dwell. Until the operator is really familiar with the hammer's operational characteristics, the hammer should be started with a long Dwell setting, then decreased after the hammer is operating.  
*Note: Allow enough time for the ram to come to rest before the lifting cycle starts again. When the dwell time is too short the ram can be "caught" creating far to much hydraulic pressure in the cylinder. We never want to "catch" the falling ram.*
- Hammer Switch:** Turning this switch to "Hand" for intermittent stroke control. Turning this switch to the "Auto" will allow continuous use.  
*Note: The engine can not be started if this switch in either Hand or Auto position. it must be in the middle "OFF" position.*
- Cycle button:** With Hammer switch in **Hand** position pushing and holding the cycle button will raise the ram until the button is released. When this button is released the ram will immediately fall. With the Hammer switch in the Auto position pushing the cycle button will start and allow the hammer to run continuously. To stop the hammer turn the hammer switch to "OFF".



# Replacement Parts

## ORDERING REPLACEMENT PARTS

### Unit Information

Provide the serial and model number of the unit when contacting APE for replacement parts. This information can be found on a tag like the one on this page. Confirm all orders in writing to avoid duplicating shipments.

### Original and Modified Equipment

The previous equipment breakdowns apply only to equipment originally furnished with the unit. Any equipment that has been changed or upgraded won't be accurate to these schematics.

### Shipment

If the shipment recipient and method of shipment isn't stated then APE will use its own judgment.

### Shortages

APE does not assume responsibility for any delay, damage, or loss of material while in transit. Damaged or lost material should be refused or a full description made of its condition to the carrier agent on the freight or express bill. Make any such claims immediately upon receipt of parts.

### Return of Parts

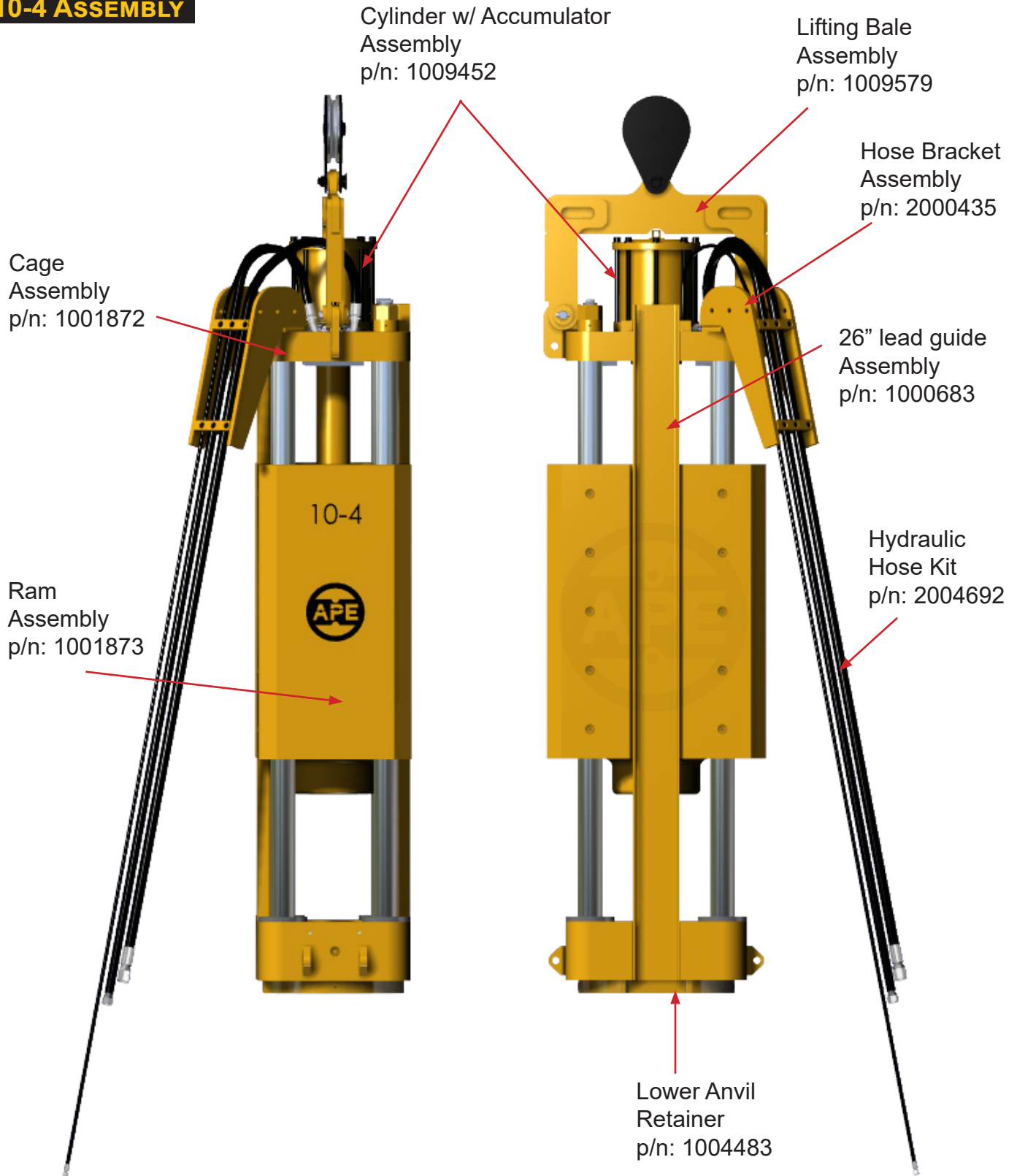
If for any reason you desire to return parts to the factory or to any distributor from whom these parts were obtained, you must first secure permission to return the parts. Shipping instructions will be given along with this permission. A ten percent handling charge must be assessed against the returned shipment unless an error is made by the factory or by the distributor when filling your order.



*A tag with identifying numbers for the unit.*

# Replacement Parts

## 10-4 ASSEMBLY



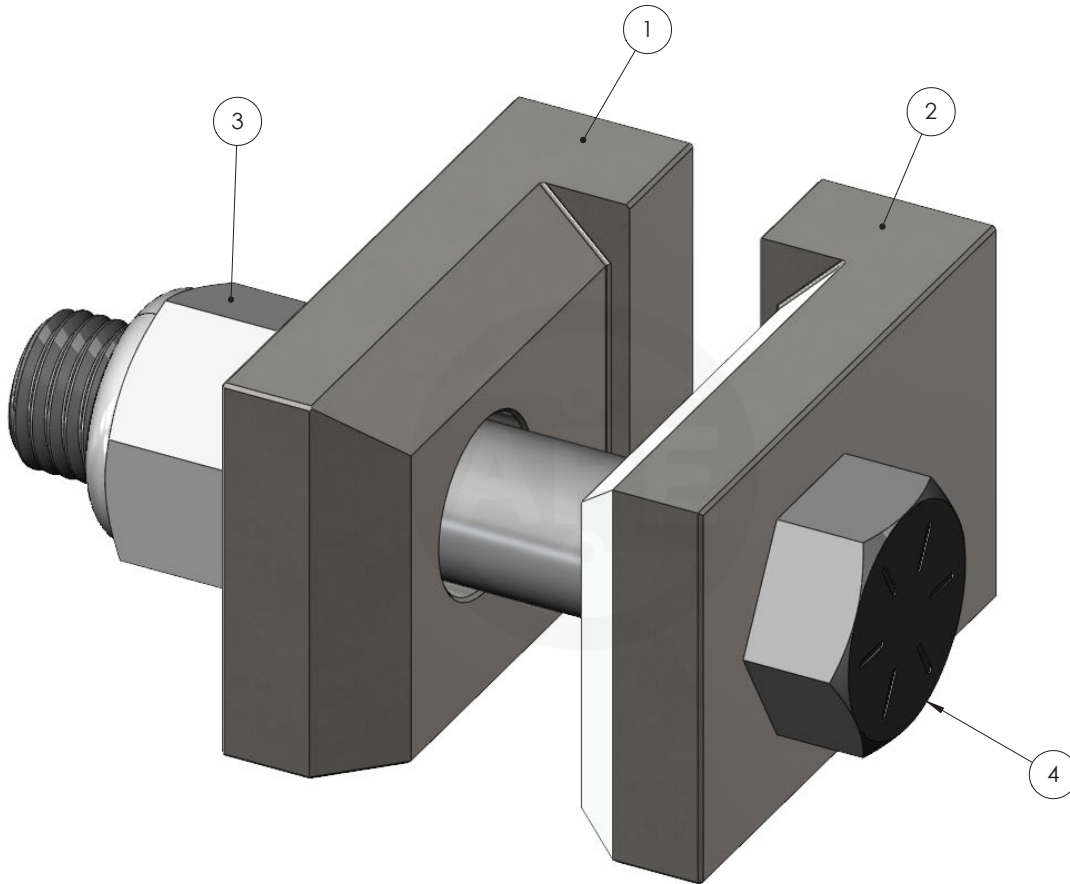
REPLACEMENT PARTS



## Replacement Parts

### ROTATION STOP BLOCK ASM

P/N: 2004842



REPLACEMENT PARTS

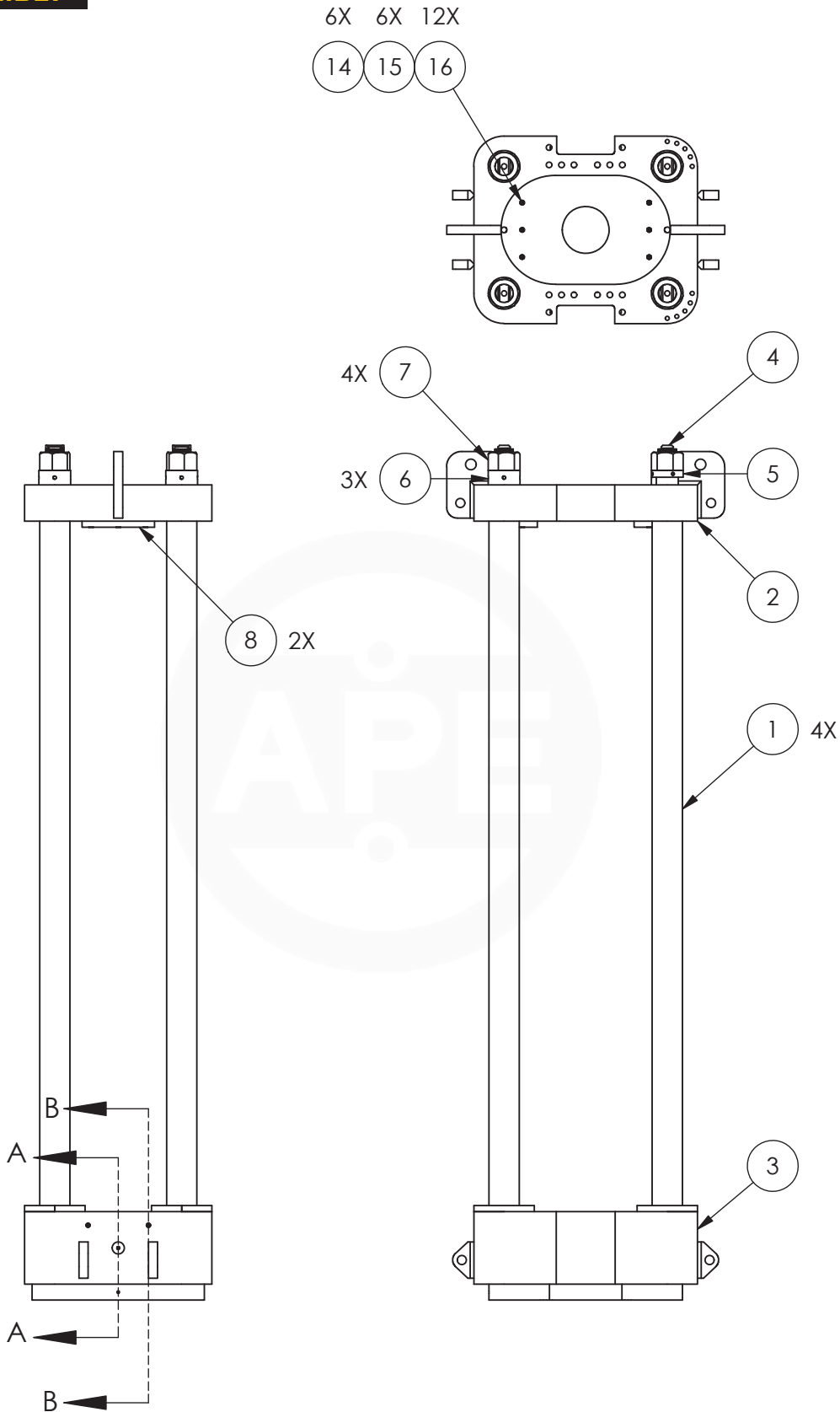
ITEM NO.	PART NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	2004840	HIH Rotation Stop LH Block	Plain Carbon Steel	1
2	2004841	HIH Rotation Stop RH Block	Plain Carbon Steel	1
3	Contact APE	1 1/4" -7 Nylon-Insert Locknut	90630A209	1
4	Contact APE	1 1/4" -7 Hex Head Screw	92620A331	1



# Replacement Parts

## CAGE ASSEMBLY

P/N: 1001872



REPLACEMENT PARTS



Page 19





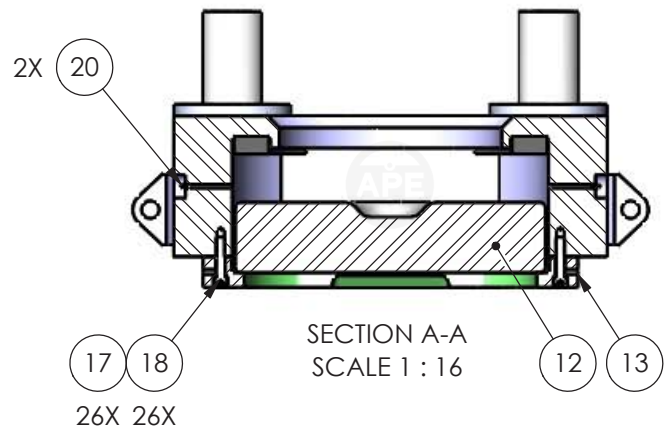
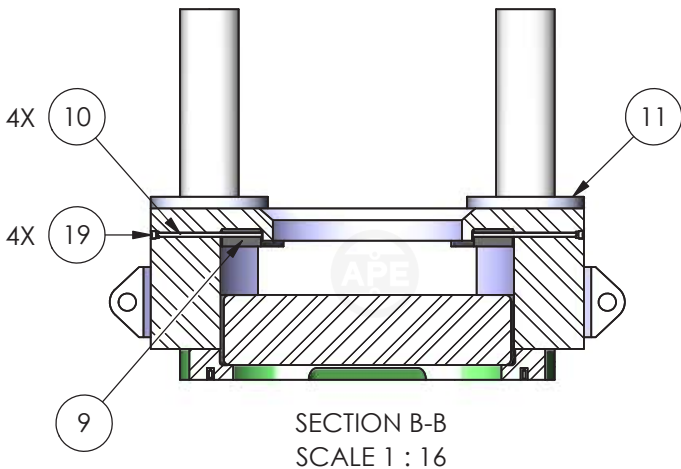
# Replacement Parts

## CAGE ASSEMBLY

P/N: 1001872

REPLACEMENT PARTS

ITEM NO.	PART NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	1000652	Guide Column	A1026	4
2	1009577	Top Plate Final Machine		1
3	1000659	Frame Bottom Plate Weldment		1
4	1000653	Wire Rope Assembly		4
5	1000684	Pivot Nut-Stepped	AISI 4140	1
6	1000654	Pivot Nut	AISI 4140	3
7	1001871	HHNut 3.000-4-B-N	3"-4 UNC Hex Nut	3
8	481211	Upper Lower Bumper	Adiprene Yellow Urethane	2
9	481179	Rebound Dampener	Urethane 90 Duro	2
10	481177	Pad Pin	AISI 1018	4
11	1000661	Bottom Bumper	PUR	4
12	481361	Striker Plate	AISI 4140	1
13	1004483	Retaining Ring	A36	1
14	Contact APE	100 Degree CS Allen .375-16x5.25	Steel	6
15	Contact APE	Regular LW 0.375		6
16	Contact APE	HHNut 0.375-16-D-N		12
17	Contact APE	Hi-Collar Lw 0.75		26
18	Contact APE	HX-SHCS 0.75-10x3.5x2.5-N		26
19	Contact APE	.375 Hex Pipe Plug		4
20	Contact APE	1/8 NPT Grease Zerk		2

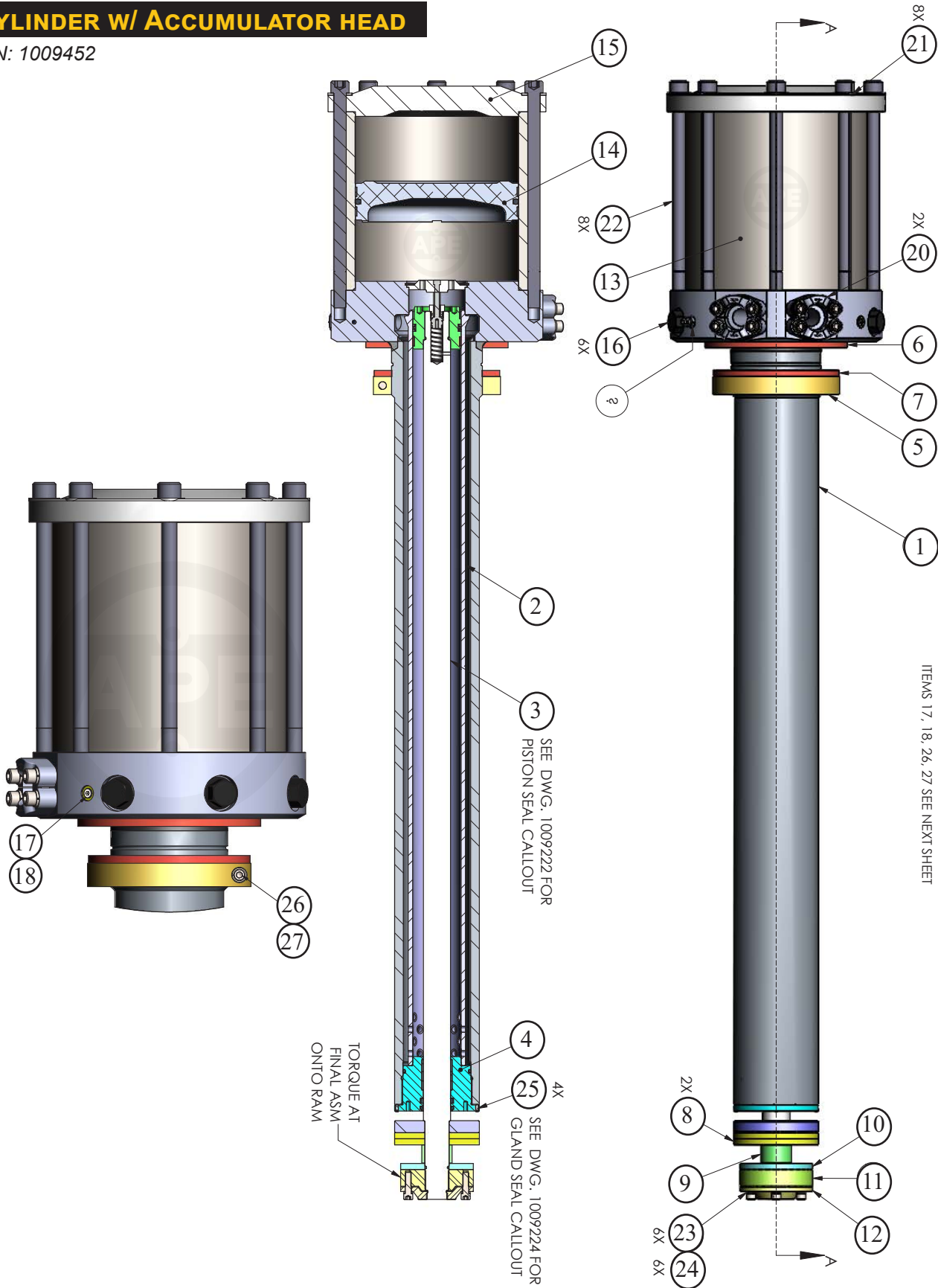




# Replacement Parts

## CYLINDER W/ ACCUMULATOR HEAD

P/N: 1009452



REPLACEMENT PARTS



# Replacement Parts

## CYLINDER W/ ACCUMULATOR HEAD

P/N: 1009452

ITEM NO.	PART NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	1009423	Accumulator Head Outer Barrel Weldment		1
2	1000668	Inner Barrel	A1026	1
3	1009222	Rod-Piston Assembly		1
4	1009224	Cyl Head Gland Assembly		1
5	481183	Hold Down Nut	A36	1
6	2004856	Upper Cushion top Side	Urethane 90A	1
7	481215	Upper Cushion Bottom	Adiprene Red Urethane	1
8	481217	Impact Cushion	Adiprene Yellow Urethane	2
9	481219	Lower Spacer	Nylatron NSM	1
10	1004879	Lifting Cushion	Nylatron NSM	1
11	481197	Rod Nut	A36	1
12	481199	Rod Jam Nut	A36	1
13	1009385	8-4, 10-4 HIH Accumulator Barrel	AISI 1015 Steel, Cold Drawn	1
14	1009388	Accumulator Piston Assembly		1
15	1009387	Accumulator Cap	AISI 4140 Steel	1
16	1000675	Sun Logic Valve - LOKC-XDN	Sun LOKC-XDN	6
17	Contact APE	1/8 NPT plug w/ Orifice	4534K11	1
18	Contact APE	#6 Sae Plug	EPC006	1
19	Contact APE	#8 JIC x #6 Sae Fitting	6400-08-06-0	1
20	Contact APE	1-1/2" Code 62 Split Flange Kit	24FL C62 Split Flange Kit	2
21	Contact APE	1" Flat Washer	98038A282	8
22	Contact APE	1"-8 UNC x 18.00" SHCS Bolt	Fastenal - 0154458	8
23	Contact APE	Hi Collar LW 0.5		6
24	Contact APE	HX-SHCS 0.5-13x1.75x1.75-N		6
25	Contact APE	SSCONESKT 0.25-20X0.625-HX-N		4
26	Contact APE	HI COLLAR LW 0.625		1
27	Contact APE	HX-SHCS 0.625-11X2.25X2.25-N		1

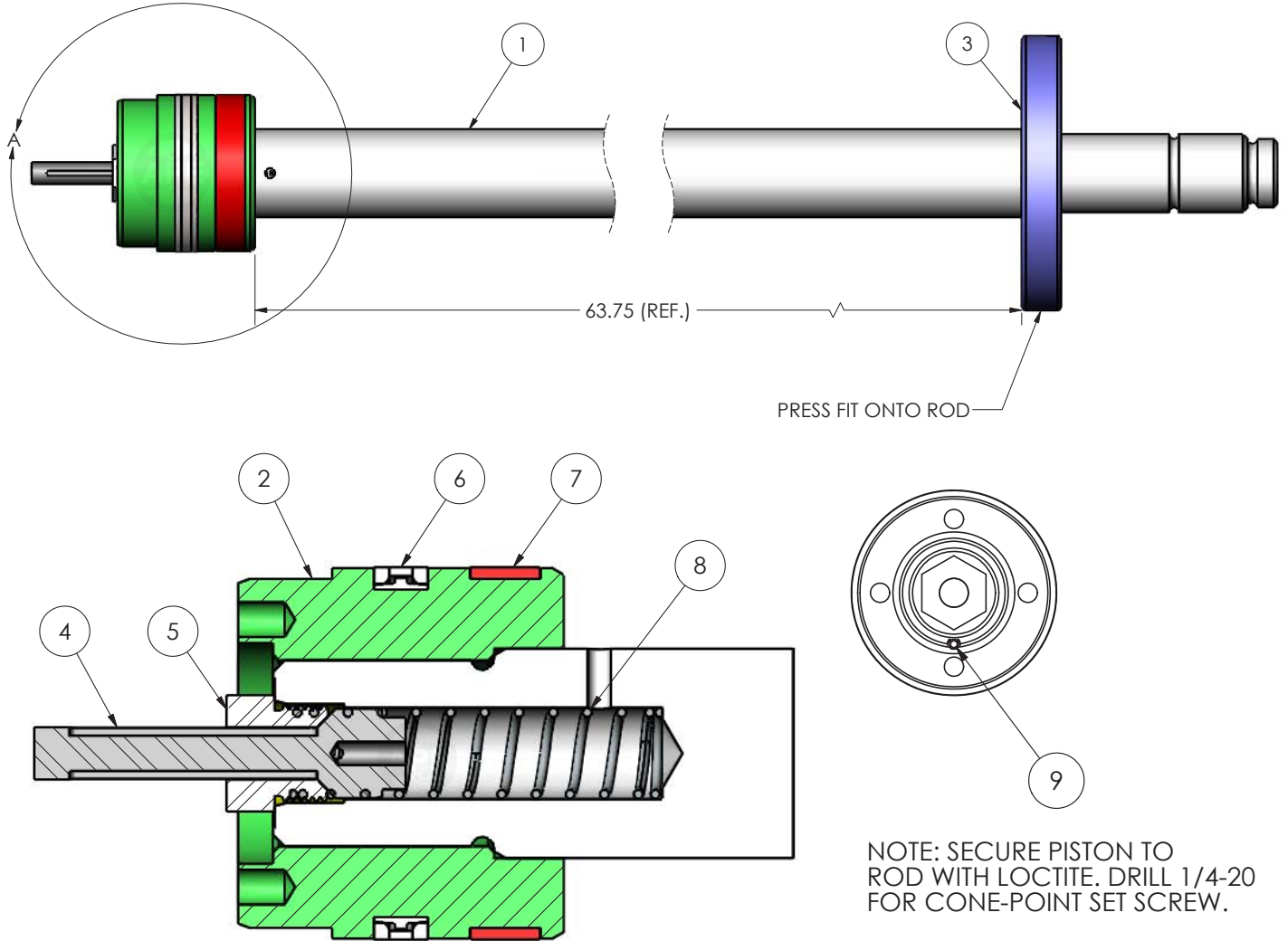
REPLACEMENT PARTS



# Replacement Parts

## ROD-PISTON ASSEMBLY

P/N: 1009222



REPLACEMENT PARTS

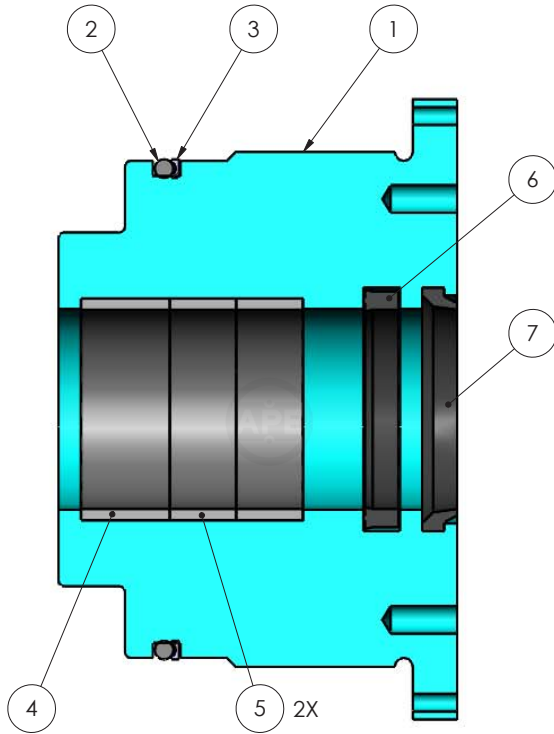
ITEM NO.	PART NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	1000669	Cylinder Rod	A36	1
2	1000688	Piston	Ductile Iron	1
3	481203	Rod End Washer	AISI 4140	1
4	1000670	Rod Plunger	AISI 4140	1
5	1000671	Rod Plunger Guide	A36	1
6	Contact APE	4 Piece Piston Seal		1
7	Contact APE	Wear Ring	Molygard - W125-4000-750	1
8	Contact APE	Compression Spring	Century - 72414CS	1
9	Contact APE	SS Coneskt .025"	SSCONESKT - 0.25-20X0.5-HX-N	1



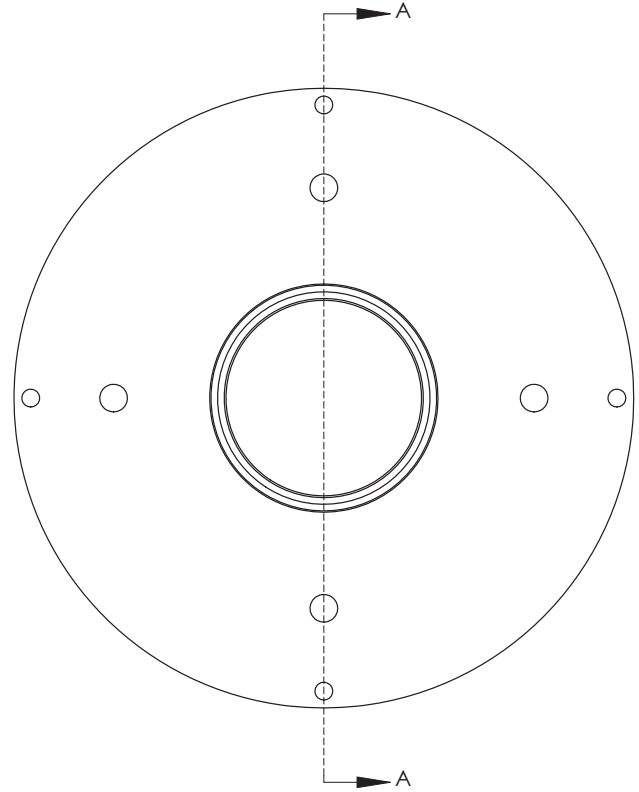
# Replacement Parts

## CYLINDER HEAD GLAND ASSEMBLY

P/N: 1009224



SECTION A-A  
SCALE 1 : 1.5



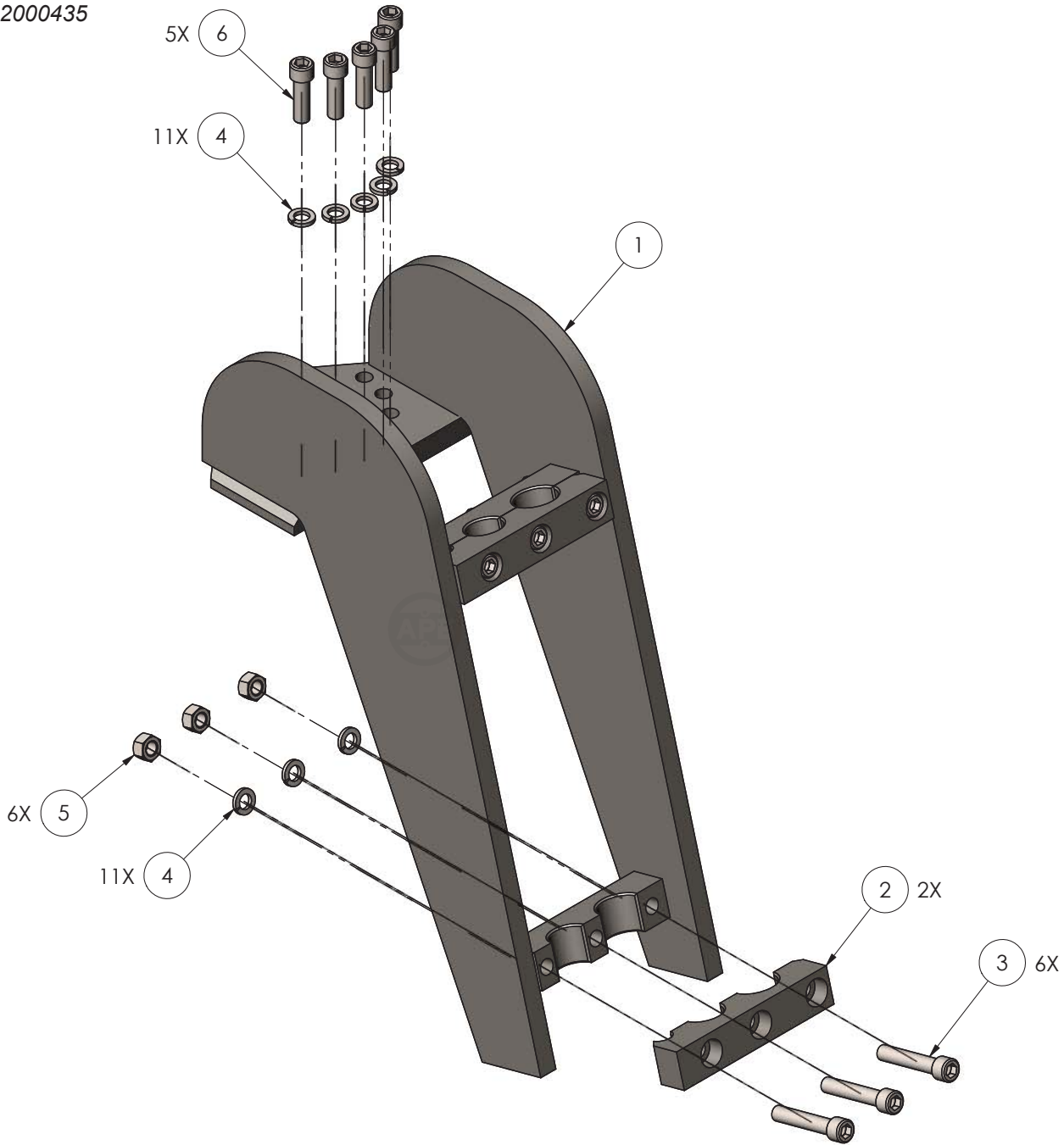
REPLACEMENT PARTS

ITEM NO.	PART NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	1000672	Cylinder Head Gland	DUCTILE IRON	1
2	130717	2-355 O Ring	2-355	1
3	Contact APE	8-355 O Ring	8-355	1
4	Contact APE	Wear Band W2-2500-1000	NYLON	1
5	Contact APE	Wear Band W2-2500-0750	NYLON	2
6	150683	Type B PolyPak 25002250-375B-4615	VITON	1
7	Contact APE	Wiper SHD2250	VITON	1

# Replacement Parts

## HOSE BRACKET ASSEMBLY

P/N: 2000435



REPLACEMENT PARTS

ITEM NO.	PART NO.	DESCRIPTION	DESCRIPTION 2	QTY
1	2000444	Hose Adjustable Bracket Sub Assembly		1
2	481293	Hose Clamp Top		2
3	Contact APE	Hose Clamp Bolts (3/4"x4" SHCS)	HX-SHCS 0.75-10x4x2-N	6
4	Contact APE	3/4" Lock Washer	Regular 0.75 LW	11
5	Contact APE	3/4" Nuts	HNUT 0.7500-10-B-N	6
6	Contact APE	Bracket to Hammer Bolts (3/4"x2.5" SHCS)	HX-SHCS 0.75-10x2.5x2.5-N	5



# Maintenance

## MAINTENANCE CHART

### NOTICE

In addition to keeping the unit in ideal condition, regular maintenance will help prevent unexpected machine downtime by finding minor issues before they can develop into serious or dangerous problems. Lubrication, inspection, and replacement of key parts are the major steps of this maintenance.

Lubrication is especially important and different components have their own schedules and lubrication types. Pay special attention to the lubrication steps noted in the chart above.

At each scheduled interval perform all previous checks which are due.

During all steps be sure to:

- Thoroughly clean all lubrication fittings, caps, filler and level plugs along with their surrounding surfaces before servicing.
- Prevent dirt and other contaminants from entering with lubricants.

These service intervals are for normal operating conditions. Reduce the time by half when:

- The average temperature is above 80°F (26°C) or below -10°F (-23°C).
- Operating in a dusty or sandy area.
- Operating for more than 12 hours per day.

Environments that are humid and/or salty do not change the service intervals. However, during all procedures check the components for corrosion.

MAINTENANCE & TROUBLESHOOTING

### DAILY

- Grease Guide Column at all grease fittings in the ram
- Grease Striker plate 20-30 shots at the beginning of shift and 4 shots every 2 hours
- Grease Lead Guides
- Check Condition of Cushion
- Check Ram Connection Cushion and Bolts
- Check all bolts on lead guide rails.
- Inspected lead guide rails and welds for cracks
- Inspected all hoses and fittings on cylinder manifold
- Check Retaining Ring Bolts



# Maintenance Conditions and Storage

## SEVERE CONDITIONS

The servicing intervals are specified on normal operation conditions. Operation under severe conditions require shorter service intervals.

- When the average outside temperature is above 80 F (26 C) or below -10 F (-23 C), reduce service time intervals by one-half.
- When operating in the presence of dust or sand, reduce service time intervals by one-half.
- When operating in air with high salt or moisture the service intervals do not need to be changed. However the unit should be inspected weekly to determine if additional servicing is required.

## OIL RECOMMENDATIONS

### Hydraulic Oil Cleanliness

When adding or changing hydraulic fluid, APE uses only Biodegradable Envirologic 146 hydraulic fluid. Consult your local oil supplier for recommendations on mixing hydraulic oils. See the warranty document at the beginning of this manual concerning fluid cleanliness, and Understanding ISO Codes at the rear of this manual.

**NOTICE**

**NEW HYDRAULIC FLUID IS NOT CLEAN OIL!  
OIL MUST MEET ISO CLEANLINESS CODE 17/15/11**

## STORAGE

During short-term storage of a HIH, the following should be taken into consideration:

- Cover any pressure openings and open threaded holes with suitable caps.
- Protect the unpainted surfaces from dirt and moisture.
- The hammer should not be stored in an area with substances that have an aggressive corrosive nature; solvents, acids, alkalies and/or salts.

For long-term storage (over 9 months), the following additional actions are recommended:

- Damages to surface paint must be repaired before item is stored.
- Protect the unpainted surfaces with suitable anti-corrosion treatment such as CRC SP-350, CorrosionX corrosion inhibitor, or WD-40 Long Term Corrosion Inhibitor.
- Fill the power unit completely with hydraulic fluid.

If these instructions are followed to the letter, the hammer may be stored for approximately 2-years. However, as storage conditions do have a significant effect, all suggested time frames should be considered as guide values only.



# Pile Bearing Chart

## Hammer Energy Output and Pile Bearing Chart APE Model 10-4 Hydraulic Impact Hammer

The energy output is based on the identical Piston/Travel calculations utilized in the **FHWA Gates Formula**.

The pile bearing chart is based on the FHWA Gates Formula for pile bearing and is provided for the user's convenience only.

$$\text{Pile Bearing (tons)} = ((1.75 * \text{SQRT "E" LOG}_{10} * 10N) - 100) / 2$$

*E = Developed Energy and N = Number of Blows Per Inch*

**APE has no preference for these particular formulas and calculations over any other.**

RAM WEIGHT (LBS): 20,000

Stroke (feet)	Energy (ft-lbs)	Pile Set (Blows per inch)																		
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0.25	5,000	30	41	49	55	60	64	68	71	74	76	79	81	83	85	86	88	90	91	92
0.50	10,000	64	79	90	99	106	111	117	121	125	129	132	135	138	140	143	145	147	149	151
0.75	15,000	89	108	122	132	141	148	154	159	164	169	173	177	180	183	186	189	192	194	197
1.00	20,000	111	133	148	160	170	178	185	192	197	203	207	212	216	219	223	226	229	232	235
1.25	25,000	130	154	172	185	196	205	213	220	227	232	238	242	247	251	255	259	262	265	268
1.50	30,000	147	174	193	207	219	230	238	246	253	259	265	270	275	280	284	288	292	295	299
1.75	35,000	163	192	212	228	241	252	262	270	277	284	290	296	301	306	311	315	319	323	327
2.00	40,000	178	208	230	247	261	273	283	292	300	307	314	320	326	331	336	340	345	349	353
2.25	45,000	191	224	247	265	280	292	303	313	321	329	336	342	348	354	359	364	369	373	377
2.50	50,000	205	239	263	282	298	311	322	332	341	349	357	364	370	376	381	386	391	396	400
2.75	55,000	217	253	279	299	315	329	341	351	360	369	377	384	390	397	402	408	413	418	422
3.00	60,000	229	267	293	314	331	345	358	369	379	388	396	403	410	416	422	428	433	438	443
3.25	65,000	240	280	307	329	347	362	375	386	396	405	414	422	429	435	442	448	453	458	463
3.50	70,000	251	292	321	343	362	377	391	402	413	423	431	439	447	454	460	466	472	478	483
3.75	75,000	262	304	334	357	376	392	406	418	429	439	448	457	464	471	478	484	490	496	501
4.00	80,000	272	316	346	370	390	407	421	434	445	455	465	473	481	489	495	502	508	514	519

REFERENCES & NOTES



## UNDERSTANDING ISO CODES

The ISO cleanliness code is used to quantify particulate contamination levels per milliliter of fluid at 3 sizes 4 $\mu$ [c], 6 $\mu$ [c], and 14 $\mu$ [c]. The ISO code is expressed in 3 numbers (ie 19/17/14). Each number represents a contaminant level code for the correlating particle size. The code includes all particles of the specified size and larger. It is important to note that each time a code increases the quantity range of particles is doubling.

ISO 4406 Chart		
Range Code	Particles per milliliter	
	More than	Up to/including
24	80000	160000
23	40000	80000
22	20000	40000
21	10000	20000
20	5000	10000
19	2500	5000
18	1300	2500
17	640	1300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	0.64	1.3
6	0.32	0.64

Sample 1 (see photo 1)

Particle Size	Particles per ml*	ISO 4406 Code range	ISO Code
4 $\mu$ [c]	151773	80000~160000	24
6 $\mu$ [c]	38363	20000~40000	22
10 $\mu$ [c]	8229		
14 $\mu$ [c]	3339	2500~5000	19
21 $\mu$ [c]	1048		
38 $\mu$ [c]	112		

Sample 2 (see photo 2)

Particle Size	Particles per ml*	ISO 4406 Code range	ISO Code
4 $\mu$ [c]	492	320 ~ 640	16
6 $\mu$ [c]	149	80 ~ 160	14
10 $\mu$ [c]	41		
14 $\mu$ [c]	15	10 ~ 20	11
21 $\mu$ [c]	5		
38 $\mu$ [c]	1		

Photo 1

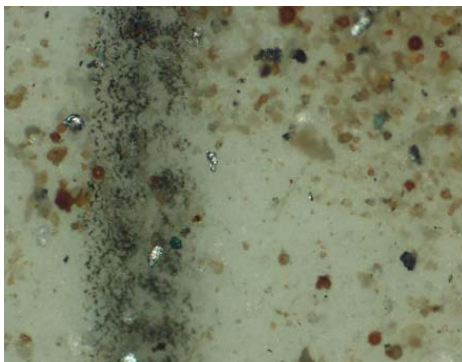


Photo 2



## TARGET ISO CLEANLINESS CODES

When setting target ISO fluid cleanliness codes for hydraulic and lubrication systems it is important keep in mind the objectives to be achieved. Maximizing equipment reliability and safety, minimizing repair and replacement costs, extending useful fluid life, satisfying warranty requirements, and minimizing production down-time are attainable goals. Once a target ISO cleanliness code is set following a progression of steps to achieve that target, monitor it, and maintain it justifiable rewards will be yours.

### Set the Target.

The first step in identifying a target ISO code for a system is to identify the most sensitive on an individual system, or the most sensitive component supplied by a central reservoir. If a central reservoir supplies several systems the overall cleanliness must be maintained, or the most sensitive component must be protected by filtration that cleans the fluid to the target before reaching that component.

### Other Considerations

Table 1 recommends conservative target ISO cleanliness codes based on a several component manufacturers guidelines and extensive field studies for standard industrial operating conditions in systems using petroleum based fluids. If a non-petroleum based fluid is used (i.e. water glycol) the target ISO code should be set one value lower for each size (4 μ[c]/6μ[c]/14μ[c]). If a combination of the following conditions exists in the system the target ISO code should also be set one value lower:

- Component is critical to safety or overall system reliability.
- Frequent cold start.
- Excessive shock or vibration.
- Other Severe operation conditions.

### Recommended\* Target ISO Cleanliness Codes and media selection for systems using petroleum based fluids per ISO4406:1999 for particle sizes 4μ[c] / 6μ[c] / 14μ[c]

	Pressure	Media	Pressure	Media	Pressure	Media
	< 140 bar	βx[c] = 1000	212 bar	βx[c] = 1000	> 212 bar	βx[c] = 1000
	< 2000 psi	(βx = 200)	3000 psi	(βx = 200)	> 3000 psi	(βx = 200)
<b>Pumps</b>						
Fixed Gear	20/18/15	22μ[c] (25 μ)	19/17/15	12μ[c] (12 μ)	-	-
Fixed Piston	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)	17/15/12	7μ[c] (6 μ)
Fixed Vane	20/18/15	22μ[c] (25 μ)	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)
Variable Piston	18/16/13	7μ[c] (6 μ)	17/15/13	5μ[c] (3 μ)	16/14/12	7μ[c] (6 μ)
Variable Vane	18/16/13	7μ[c] (6 μ)	17/15/12	5μ[c] (3 μ)	-	-
<b>Valves</b>						
Cartridge	18/16/13	12μ[c] (12 μ)	17/15/12	7μ[c] (6 μ)	17/15/12	7μ[c] (6 μ)
Check Valve	20/18/15	22μ[c] (25 μ)	20/18/15	22μ[c] (25 μ)	19/17/14	12μ[c] (12 μ)
Directional (solenoid)	20/18/15	22μ[c] (25 μ)	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)
Flow Control	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)
Pressure Control (modulating)	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)	17/15/12	7μ[c] (6 μ)
Proportional Cartridge Valve	17/15/12	7μ[c] (6 μ)	17/15/12	7μ[c] (6 μ)	16/14/11	5μ[c] (3 μ)
Proportional Directional	17/15/12	7μ[c] (6 μ)	17/15/12	7μ[c] (6 μ)	16/14/11	5μ[c] (3 μ)
Proportional Flow Control	17/15/12	7μ[c] (6 μ)	17/15/12	7μ[c] (6 μ)	16/14/11	5μ[c] (3 μ)
Proportional Pressure Control	17/15/12	7μ[c] (6 μ)	17/15/12	7μ[c] (6 μ)	16/14/11	5μ[c] (3 μ)
Servo Valve	16/14/11	7μ[c] (6 μ)	16/14/11	5μ[c] (3 μ)	15/13/10	5μ[c] (3 μ)
<b>Bearings</b>						
Ball Bearing	15/13/10	5μ[c] (3 μ)	-	-	-	-
Gearbox (industrial)	17/16/13	12μ[c] (12 μ)	-	-	-	-
Journal Bearing (high speed)	17/15/12	7μ[c] (6 μ)	-	-	-	-
Journal Bearing (low speed)	17/15/12	7μ[c] (6 μ)	-	-	-	-
Roller Bearing	16/14/11	7μ[c] (6 μ)	-	-	-	-
<b>Actuators</b>						
Cylinders	17/15/12	7μ[c] (6 μ)	16/14/11	5μ[c] (3 μ)	15/13/10	5μ[c] (3 μ)
Vane Motors	20/18/15	22μ[c] (25 μ)	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)
Axial Piston Motors	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)	17/15/12	7μ[c] (6 μ)
Gear Motors	20/18/14	22μ[c] (25 μ)	19/17/13	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)
Radial Piston Motors	20/18/15	22μ[c] (25 μ)	19/17/14	12μ[c] (12 μ)	18/16/13	12μ[c] (12 μ)
<b>Test Stands, Hydrostatic</b>						
Test Stands	15/13/10	5μ[c] (3 μ)	15/13/10	5μ[c] (3 μ)	15/13/10	5μ[c] (3 μ)
Hydrostatic Transmissions	17/15/13	7μ[c] (6 μ)	16/14/11	5μ[c] (3 μ)	16/14/11	5μ[c] (3 μ)

\*Depending upon system volume and severity of operating conditions a combination of filters with varying degrees of filtration efficiency might be required (i.e. pressure, return, and off-line filters) to achieve and maintain the desired fluid cleanliness.

Example	ISO Code	Comments
Operating Pressure	156 bar, 2200 psi	
Most Sensitive Component	Directional Solenoid	19/17/14 recommended baseline ISO Code
Fluid Type	Water Glycol	18/16/13 Adjust down one class
Operating Conditions	Remote location, repair difficult	Adjust down one class, combination
	High ingestion rate	17/15/12 of critical nature, severe conditions

## Bolt Reference

# RECOMMENDED BOLT TIGHTENING TORQUE “LUBRICATED SHCS”

Socket Head Cap Screws

When installing any APE equipment or parts apply lubricant and use APE standard **Anti-Seize** torque specs. See Tightening Torque Spec below. Failure to follow tightening torque spec can result in under / over tightening fasteners, leading to equipment failure or personal injury.



### COARSE THREADS

Nominal Screw Size	Nominal Socket Size	Tightening Torque (ft-lbs)
#10-24	5/32	6
.25-20	3/16	10
.31-18	1/4	22
.38-16	5/16	38
.44-14	3/8	61
.50-13	3/8	93
.63-11	1/2	179
.75-10	5/8	317
.88-9	3/4	511
1.00-8	3/4	767
1.25-7	7/8	1,533
1.50-6	1	2,668

### FINE THREADS

Nominal Screw Size	Nominal Socket Size	Tightening Torque (ft-lbs)
#10-32	5/32	6
.25-28	3/16	12
.31-24	1/4	24
.38-24	5/16	43
.44-20	3/8	68
.50-20	3/8	105
.63-18	1/2	202
.75-16	5/8	354
.88-14	3/4	564
1.00-12	3/4	860
1.25-12	7/8	1,697
1.50-12	1	3,001

## RECOMMENDED ANTI-SEIZE LUBRICANT

### BENEFITS & FEATURES

- **Excellent Anti-Seize** Prevents seizing caused by galling, galvanic action, fretting, fusion, pitting, thread distortion, breakage, rust, and corrosion.
- **Water Resistant** Provides long term protection with just one application, outdoors or indoors, even in the damp areas or against salt spray. Will not wash off.
- **Wide Temperature Range** Coating withstands temperatures of -65 Degree F to 2100 Degree F. (-54 C to 1100 C)
- **Stable Coating** Will not harden or fuse to metal, cake, evaporate or separate
- **Compatible with many materials** Can be used as an anti-seize on the threads of steel, stainless steel, steel alloy, cast iron, aluminum, copper brass, and titanium parts and reduces friction and wear on plastic.
- **Environmentally Desirable** Past contains no lead compounds traditionally found in this type of product.



**WARNING: USING OTHER TYPES OF ANTI-SEIZE NOT RECOMMENDED BY APE CAN LEAD TO EQUIPMENT FAILURE OR PERSONAL INJURY. WARRANTY WILL BE VOIDED AND FEES MAY APPLY.**

REFERENCES & NOTES



All information given in this Manual is current and valid per the information available at the time of publication. (Please check the updated revision date at the bottom of each page.)

American Piledriving Equipment (APE) reserves the right to implement changes without prior notice.

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