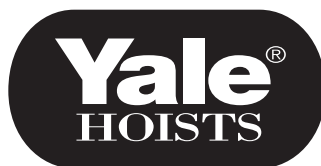


# OPERATION, MAINTENANCE & PARTS MANUAL

## HAND CHAIN HOIST

### HAND CHAIN HOIST WITH INTEGRATED TROLLEY (GEARED & PLAIN)



## YALELIFT 360™ ATEX HAND CHAIN HOIST

Before installing hoist, fill in the information below.

Rated Load \_\_\_\_\_

Serial No. \_\_\_\_\_

Purchase Date \_\_\_\_\_

#### Rated Loads:

**1/4, 1/2, 1, 1½, 2, 3, 4, 5, 6, 8, 10 & 12 tonne**  
**(250, 500, 1000, 1500, 2000, 3000, 4000, 5000,**  
**6000, 8000, 10000 & 12000 kg)**

Follow all instructions and warnings for inspecting, maintaining and operating this hoist.

The use of any hoist presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this hoist, each operator should become thoroughly familiar with all warnings, instructions and recommendations in this manual. **Retain this manual for future reference and use.**

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.

#### ATEX RATING:

**Ex II 2 GD c IIC T4**



## HOIST PARTS AND SERVICES ARE AVAILABLE IN THE UNITED STATES AND IN CANADA

As a Columbus McKinnon hoist and trolley user you are assured of reliable repair and parts services through a network of Master Parts Depots and Service Centers that are strategically located in the United States and Canada. These facilities have been selected on the basis of their demonstrated ability to handle all parts and repair requirements promptly and efficiently. To quickly obtain the name of the Master Parts Depot or Service Center located nearest you, call (800) 888-0985, fax (716) 689-5644 or visit [www.cmworks.com](http://www.cmworks.com).

### CLASSIFICATION FOR CORRECT OPERATION

Protection Classification: **II 2 GD c IIC T4**

Hand Chain Material: **Stainless Steel**

Load Chain Material: **Stainless Steel**

Load and Top Hook: **Copper-plated**

Trolley: **Trolley with Buffer**

Roller: **Bronze Plain Roller**

### PROTECTION CLASSIFICATION:

**II 2 GD c IIC T4**

**II:** Unit group II = other areas

**2:** Category 2 for zone 1 and 2  
(resp. zone 21 and 22)

**GD:** G for gas, D for dust

**c:** Type of ignition protection  
(c - constructive safety)

**IIC:** Group of gases

**T4:** Class of temperatures  
(T4 - 135 °C)

### MAXIMUM SURFACE TEMPERATURE OF THE EQUIPMENT FOR CORRECT OPERATION IN DUSTY ENVIRONMENTS

Model/Capacity	Temperature	
	°F	°C
¼	221	105
½	221	105
1	257	125
1½	239	115
2	239	115
3	239	115
4	239	115
5	239	115
6	239	115
8	239	115
10	239	115
12	239	115

# HOIST SAFETY IS UP TO YOU...

## **WARNING**

DO NOT LIFT MORE THAN RATED LOAD.

DO OPERATE WITH MANUAL POWER ONLY (ONE OPERATOR)

### **CHOOSE THE RIGHT HOIST FOR THE JOB...**

Choose a hoist with the capacity for the job. Know the capacities of your hoists and the weight of your loads.

Then match them.

The application, the size and type of load, the attachments to be used and the period of use must also be taken into consideration in selecting the right hoist for the job.

Remember, the hoist was designed to ease our burden and carelessness not only endangers the operator, but in many cases, a valuable load.



## **WARNING**

DO NOT OPERATE DAMAGED OR MALFUNCTIONING HOIST.

DO NOT OPERATE WITH TWISTED, KINKED, OR DAMAGED CHAIN.

### **INSPECT**

All hoists should be visually inspected before use, in addition to regular, periodic maintenance inspections.

Inspect hoists for operations warning notices and legibility.

Deficiencies should be noted and brought to the attention of supervisors. Be sure defective hoists are tagged and taken out of service until repairs are made.

Under no circumstances should you operate a malfunctioning hoist.



Check for gouged, twisted, distorted links and foreign material. Do not operate hoists with twisted, kinked, or damaged chain links.

Load chain should be properly lubricated.

Hooks that are bent, worn, or whose openings are enlarged beyond normal throat opening should not be used. If latch does not engage throat opening of hook, hoist should be taken out of service.

Chains should be checked for deposits of foreign material which may be carried into the hoist mechanism.

Check brake for evidence of slippage under load.

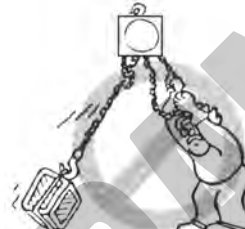


## **WARNING**

DO NOT PULL AT AN ANGLE. BE SURE HOIST AND LOAD ARE IN A STRAIGHT LINE.

DO NOT USE LOAD CHAIN AS A SLING.

### **USE HOIST PROPERLY**



Be sure hoist is solidly held in the uppermost part of the support hook arc.

Be sure hoist and load are in a straight line. Do not pull at an angle.

Be sure load is hooked securely. Do not tip load the hook. Do not load hook latch. Hook latch is to prevent detachment of load under slack chain conditions only.

Do not operate with hoist head resting against any object. Lift the load gently. Do not jerk it.



## **WARNING**

DO NOT LIFT PEOPLE OR LOADS OVER PEOPLE

### **PRACTICE CAUTION ALWAYS**

Do not lift co-workers with a hoist.

Make sure everyone is clear of the load when you lift.

Do not remove or obscure operational warning notices.

### **OPERATOR SERVICE**

#### **CLEANING**

Hoists should be kept clean and free of dust, dirt, moisture, etc., which will in any way affect the operation or safety of the equipment.

#### **LUBRICATION**

Chain should be properly lubricated.

#### **AFTER REPAIRS**

Carefully operate the hoist before returning it to full service.



**VIOLATIONS OF ANY OF THE WARNINGS LISTED MAY RESULT IN SERIOUS PERSONAL INJURY TO THE OPERATOR OR NEARBY PERSONNEL BY NATURE OF RELEASED LOAD OR BROKEN HOIST COMPONENTS.**

## **WARNING**

Improper operation of a hoist can create a potentially hazardous situation which, if **not** avoided, could result in death, or serious injury. To avoid such a potentially hazardous situation, the operator shall:

1. **NOT** operate a malfunctioning or unusually performing hoist.
2. **NOT** operate the hoist until you have thoroughly read and understood this manual.
3. **NOT** operate a hoist which has been modified.
4. **NOT** lift or pull more than rated load for the hoist.
5. **NOT** use damaged hoist or hoist that is **Not** working properly.
6. **NOT** use hoist with twisted, kinked, damaged, or worn load chain.
7. **NOT** use the hoist to lift, support, or transport people.
8. **NOT** lift loads over people and make sure all personnel remain clear of the supported load.
9. **NOT** attempt to lengthen the load chain or repair damaged load chain.
10. Protect the hoists load chain from weld splatter or other damaging contaminants.
11. **NOT** use load chain as a sling or wrap load chain around load.
12. **NOT** apply the load to the tip of the hook or to the hook latch.
13. **NOT** apply load unless load chain is properly seated in the chain wheel(s) or sprocket(s).
14. **NOT** apply load if bearing prevents equal loading on all load supporting chains..
15. **NOT** operate beyond the limits of the load chain travel
16. **NOT** leave load supported by the hoist unattended unless specific precautions have been taken.
17. **NOT** allow the chain or hook to be used as an electrical or welding ground.
18. **NOT** allow the chain or hook to be touched by a live welding electrode.
19. **NOT** remove or obscure the warnings on the hoist.
20. **NOT** operate a hoist which has **Not** been securely attached to a suitable support..
21. **NOT** operate a hoist unless load slings or other approved single attachments are properly sized and seated in the hook saddle.
22. **NOT** operate a hoist when it is restricted from forming a straight line from hook to hook in the direction of loading.
23. **NOT** lift loads that are **Not** balanced and that the holding action is **Not** secure, taking up slack carefully.
24. **NOT** operate a hoist unless all persons are and remain clear of the supported load.
25. Report malfunctions or unusual performances of a hoist, after it has been shut down until repaired.
26. **NOT** operate a hoist on which the safety placards or decals are missing or illegible.
27. Be familiar with operating controls, procedures and warnings.

## **CAUTION**

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. To avoid such a potentially hazardous situation, the operator shall:

1. Maintain a firm footing or be otherwise secured when operating the hoist.
2. Check brake function by tensioning the hoist prior to each lift or pulling operation.
3. Use hook latches. Latches are to retain slings, chains, etc. under slack conditions only.
4. Make sure the hook latches are closed and **not** supporting any parts of the load.
5. Make sure the load is free to move and will clear all obstructions.
6. Avoid swinging the load or hook.
7. Inspect the hoist regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
8. Use Columbus McKinnon parts when repairing the unit.
9. Lubricate load chain as recommended in this manual.
10. **NOT** operate except with manual power.
11. **NOT** permit more than one operator to pull on lever at the same time. More than one operator is likely to cause hoist overload.
12. **NOT** allow your attention to be diverted from operating the hoist.
13. **NOT** allow the hoist to be subjected to sharp contact with other hoists, structures, or objects through misuse.
14. **NOT** adjust or repair the hoist unless qualified to perform such adjustments or repairs.

**The hoists are intended for general industrial use for moving loads within their load ratings. Prior to installation and operation, the user should review the application for abnormal environmental or handling conditions.**

## **CAUTION**

The following applies for all models with integrated trolleys (YLITP/YLITG):

Loads must not be turned in normal operation, since the trolley has not been designed for this purpose and the wheel flanges may be pressed against the beam flange (danger of spark formation!). If loads must be turned in normal operation, an anti-twist swivel must be used or the manufacturer must be consulted.

1. Enlarging the adjusted trolley width, e.g. to enable the trolley to negotiate smaller curve radii, is forbidden.
2. Only one load lifting attachment may be suspended in the load hook of the hoist.  
ATTENTION: The load lifting attachment must also be suitable for the ATEX area.
3. Never reach into moving parts.
4. Do not allow the unit to fall from a large height. Always place it properly on the ground.
5. The unit may be used in potentially explosive atmospheres (note identification!).



## GENERAL SAFETY INFORMATION (CONTINUED)

### MOVING HAZARDOUS LOADS

The hoists are not recommended for lifting materials that could cause widespread damage if dropped. The lifting or moving of materials that could explode or cause chemical or radioactive contamination requires fail-safe, redundant supporting devices that are not incorporated into these hoists.

### TEMPERATURE LIMITS IN EXPLOSIVE ATMOSPHERES AND DUSTS

In order to determine the maximum surface temperature, several tests have been performed with nominal load under extreme conditions. The maximum surface temperature has been determined at a room temperature of 68°F (20°C) to 72°F (22°C) without dust deposit and without safety factors!

Based on these tests, the Yalelift range has been classified in temperature class T4 (275°F/135°C maximum surface temperature) for gases. The relevant values for dusts can be found on page 2.

These values refer to a lowering process of up to 10 m without disruption. For longer lowering processes, e.g. 15 m or more, breaks must be made for cooling.

The hoist may be used at ambient temperatures between -4°F (-20°C) and 104°F (40°C). Consult the manufacturer in the case of extreme working conditions.

The temperature range refers to -4°F (-20°C) up to 104°F (40°C). In case of deviating loading or temperature ranges consult the manufacturer.

### Units for operation in areas with potentially explosive gases/air resp. steam/air atmospheres or inflammable mist

The temperatures of all equipment, protective systems and components surfaces which can come into contact with explosive atmospheres must not exceed the ignition temperature of the combustible gas or liquid during normal operation and in the case of malfunctions. However, where it cannot be excluded that the gas or vapor can be heated to the temperature of the surface, this surface temperature must not exceed 80% of the ignition temperature of the gas measured in °C. This value may only be exceeded in the case of rare malfunctions.

### Units for operation in dust /air atmospheres

In areas, which are explosive by inflammable dusts, the surface temperature must not exceed 2/3 of the minimum ignition point in degrees Celsius (°C) of the dust/air mixture. Temperatures of surfaces, which can be subject to dangerous deposits of ignitable dusts, must be one safety margin lower than the minimum ignition temperature of the layer which can possibly be generated by the respective dust. This requires a safety margin of 75 K between the minimum ignition point of a dust deposit (ignition temperature) and the surface temperature of the unit. If the dust deposit exceeds a thickness of 5 mm, larger safety margins are required.

### Combustion and explosion characteristics of dusts:

*Starch / milk powder / gelatine*  
Ignition temperature 390 °C x 2/3 = 260 °C max. permissible surface temperature.

*Wood / grinding dust*  
Ignition temperature 290 °C - 75 °C = 215 °C max. permissible surface temperature.

### Classification of the hoists

After intensive testing under extreme conditions the hoist series Yalelift can be classified for correct operation in the general industry as follows on page 2. The documents have been checked by a nominated body and deposited at TÜV Rheinland Industrie Service GmbH, Haumannplatz 4, 45130 Essen.

## IDENTIFICATION

In order to exactly identify the product, you will find the identity plate with all pertinent data on the gear cover. In case of queries with regard to handling the product, which are not covered by these operating instructions, please contact:

COLUMBUS McKINNON CORPORATION  
140 John James Audubon Parkway  
Amherst, NY 14224 U.S.A  
Phone: 800-888-0985 • Fax: 716-689-5644  
www.cmworks.com

## SPARK FORMATION

### Materials subject to danger of friction and impact

Individual sparks can be generated as a result of frictional and/or impact processes and, as a consequence, can be the cause of dangers of ignition in gases or impact-sensitive dusts. Increased danger of ignition may emanate from clashing of special material pairings. These are non corrosion-resistant steel or cast iron against magnesium or pertinent alloys. This applies especially in case of rust (e.g. surface rust).

Especially at the friction points of the chain and load hook rust (surface rust) may occur. For correct operation of the product it must therefore be ensured that there is no rust at these wear points and that in the application area there are no material combinations of the above-mentioned aluminium alloys and steel (exception: antirust steel) at possible friction, impact or grinding points; thus spark formation by these material combinations as a result of mechanical impact can be excluded.

### Hand and load chain

Always ensure that the hand chain, load chain and the load are guided to exclude grinding and/or sliding contact with external constructions or components. Depending on the degree of corrosion, the conductive discharge capability of hand chains and/or load chains can worsen to an effect that it is not adequate any longer. For operation this means that rusty hand chains and/or load chains must no longer be used.

**Attention:** The user has to operate the unit to avoid sparking from the hand chain as well as from the load chain. YLITP/YLITG models must always be operated from below.

For additional safety and to avoid sparking by impact or friction during operation, the units are equipped with stainless steel hand chains.

Units have copper-plated top and bottom hooks and are fitted with stainless steel load chain.

Trolleys are always provided with buffer and solid bronze wheels. Geared trolleys are equipped with stainless steel hand chain.

### Attachment points

Attachment points have to be selected to ensure that the expected forces can be safely absorbed. The unit must align freely under load in order to avoid impermissible additional loading.

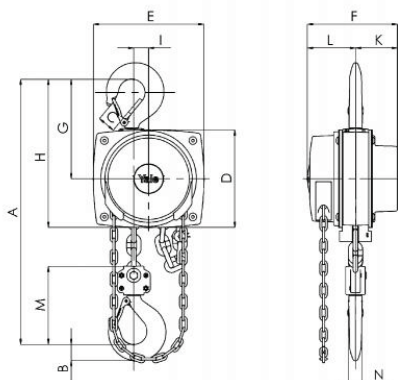
## STATIC ELECTRICITY

In order to avoid electrostatic charging on plastic parts, the user should wear suitable protective clothing, e. g. conductive footwear, clothes and gloves. It is also advised that the product is used on a conductive floor.

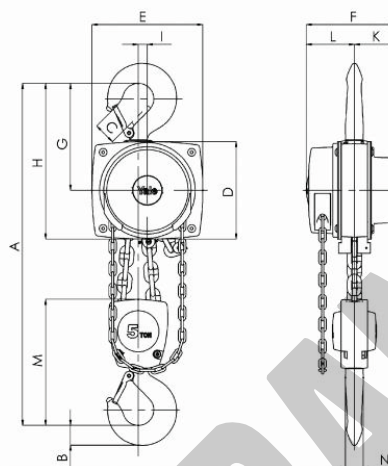
Cleaning only with a damp cloth (when cleaning these components, make sure to apply only materials which do not allow electrostatic charging).

Special feature of hydrogen (explosion group IIC): Hydrogen only requires an extremely small energy for ignition. For this reason, we recommend that prior to application of the unit a release measurement be carried out. The spark for ignition may be generated electrostatically or mechanically by handling of a tool, for example.

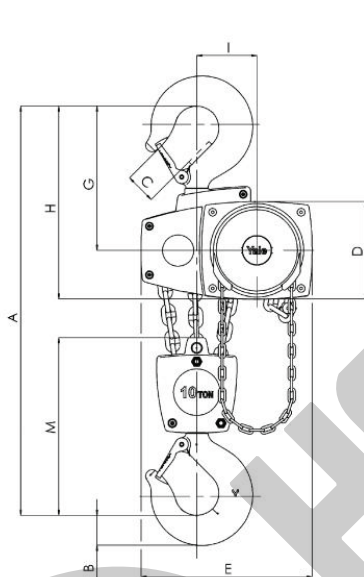
## DIMENSIONS & SPECIFICATIONS HOOK MOUNTED HOIST



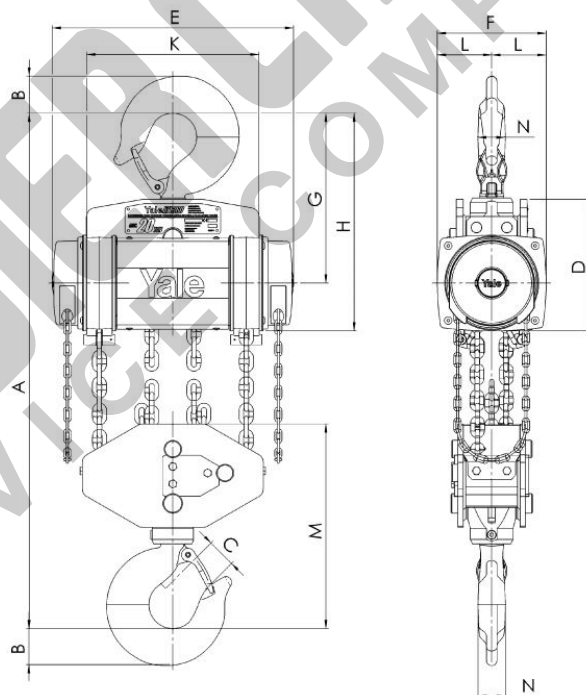
**1/4 to 2 ton**  
single fall models



**3 to 4 ton**  
double fall models



**5 to 6 ton**  
three fall models

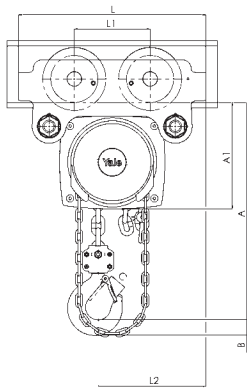


**8 to 12 ton**  
six fall models

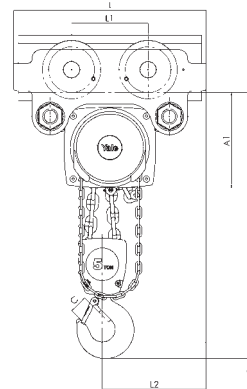
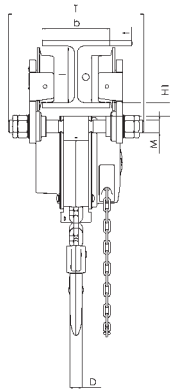
Figure 1a – Specifications

Capacity (ton)	Dimensions in. (mm)												
	A	B	C	D	E	F	G	H	I	K	L	M	N
1/4, 1/2 & 1	13.19 (335)	0.87 (22)	1.14 (29)	6.14 (156)	6.89 (175)	6.58 (167)	6.46 (164)	9.53 (242)	0.95 (24)	2.76 (70)	3.82 (97)	4.92 (125)	0.75 (19)
1 1/2 & 2	20.47 (520)	1.50 (38)	1.58 (40)	8.66 (220)	9.84 (250)	8.62 (219)	8.86 (225)	13.19 (335)	1.34 (34)	3.74 (95)	4.88 (124)	7.01 (178)	1.18 (30)
3 & 4	25.75 (654)	1.77 (45)	1.85 (47)	8.66 (220)	9.84 (250)	8.62 (219)	9.53 (242)	13.86 (352)	0.83 (21)	3.74 (95)	4.88 (124)	11.22 (285)	1.46 (37)
5 & 6	32.48 (825)	2.68 (68)	2.68 (68)	8.66 (220)	15.08 (383)	8.62 (219)	12.84 (326)	17.17 (436)	5.35 (136)	3.74 (95)	4.88 (124)	15.79 (401)	1.97 (50)
8, 10 & 12	39.76 (1010)	3.35 (85)	2.52 (64)	11.93 (303)	21.85 (555)	9.84 (250)	15.39 (391)	19.72 (501)	—	15.59 (396)	4.92 (125)	18.54 (471)	2.21 (56)

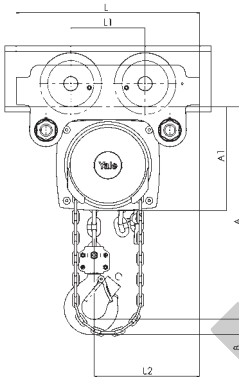
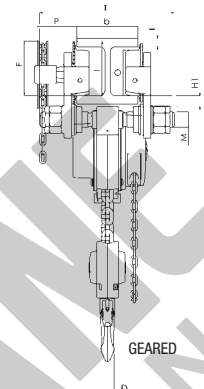
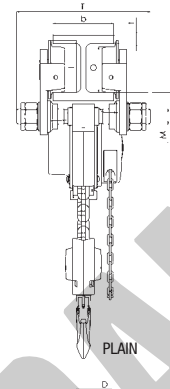
# DIMENSIONS & SPECIFICATIONS HOIST WITH INTEGRATED TROLLEY



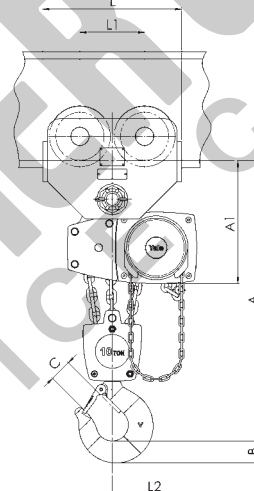
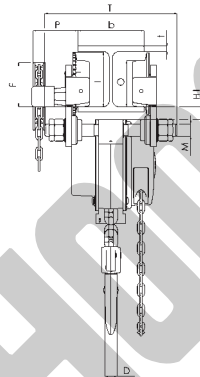
**1/4 to 2 ton  
with integrated trolley (PLAIN)**  
single fall models



**3 to 4 ton  
with integrated trolley (PLAIN & GEARED)**  
double fall models



**1/4 to 2 ton  
with integrated trolley (GEARED)**  
single fall models



**5 to 6 ton  
with integrated trolley (GEARED)**  
three fall models

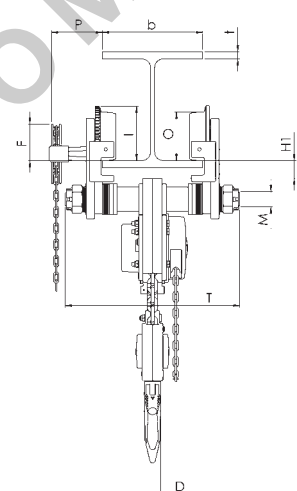


Figure 1b – Specifications

Capacity (ton)	Dimensions in. (mm)																	
	A (min.)	A1	A2	B	C	D	F Geared Trolley	H1	I		L	L1	L2	M	O	P Geared Trolley	T	
									Plain Trolley	Geared Trolley							Area A	Area B
¼, ½ & 1	10.71 (272)	7.01 (178)	—	0.87 (22)	1.14 (29)	0.75 (19)	3.62 (92)	0.94 (24)	2.81 (71.5)	3.01 (76.5)	12.20 (310)	5.12 (130)	6.89 (175)	M 22	2.36 (60)	4.33 (110)	11.42 (290)	16.14 (410)
1½ & 2	15.04 (382)	9.92 (252)	—	1.50 (38)	1.57 (40)	1.18 (30)	4.21 (107)	1.26 (32)	5.16 (131)	5.22 (132.5)	17.52 (445)	7.09 (180)	10.08 (256)	M 30	4.41 (112)	4.41 (112)	12.60 (320)	17.32 (440)
3 & 4	21.65 (550)	10.26 (260.5)	—	1.77 (45)	1.85 (47)	1.46 (37)	5.89 (149.5)	1.20 (30.5)	5.61 (142.5)	5.85 (148.5)	20.67 (525)	8.23 (209)	11.14 (283)	M 42	4.92 (125)	4.61 (117)	14.33 (364)	19.06 (484)
5 & 6	30.87 (784)	14.96 (380)	—	2.68 (68)	2.68 (68)	1.97 (50)	4.45 (113)	2.17 (55)	6.65 (169)	6.65 (169)	16.93 (430)	7.87 (200)	10.28 (261)	M 48	5.91 (150)	6.22 (158)	—	21.26 (540)

Dimensions for 8, 10 & 12-ton capacities available upon request.

## GENERAL INFORMATION

Yale Yalelift 360™ ATEX hand chain hoists are highly versatile materials handling equipment that can be used to effectively lift loads. The frame and covers are made from steel stampings. Internal gears are made of high grade, heat treated steel. Shielded ball bearings or bushings support the heat treated steel liftwheel. Latch type, forged steel upper and lower hooks are standard. A dry type friction brake that does not include pawls and ratchet found in similar hoists provides positive load control and will suspend the load at any point.

Hoists with load ratings of ¼, ½, 1, 1½, 2, 3, 4, 5, 6, 8, 10 & 12 ton are available and this manual applies to all of these units. Standard lift is 10 feet. Hoists with longer lifts are available on a special, per order basis. Stainless steel hand chain is provided with a drop that is 1 foot less than the lift of the hoist.

Yale Yalelift 360™ ATEX hand chain hoists are built in accordance with the specifications contained herein and at the time of manufacture complies with our interpretation of the American Society of Mechanical Engineers (ASME) Standard B30.16, "Overhead Hoists." Copies of this standard can be obtained from ASME Order Department, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300, USA.

This manual contains important information to help you properly install, operate and maintain your hoist for maximum performance, economy and safety.

Please study its contents thoroughly before putting your hoist into operation. By practicing correct operating procedures and by carrying out the recommended preventive maintenance suggestions, you will be assured of long, dependable and safe service.

After you have completely familiarized yourself with the contents of this manual, we recommend that you carefully file it for future reference.

### REPAIR/REPLACEMENT POLICY

All Yale Yalelift 360™ ATEX hand chain hoists are inspected and performance tested prior to shipment. If any properly maintained hoist develops a performance problem, within one year of shipment, due to a material or workmanship defect, as verified by Columbus McKinnon, repair or replacement of the unit will be made to the original purchaser without charge. This repair/ replacement policy applies only to Yale Yalelift 360™ ATEX hand chain hoists installed, maintained and operated as outlined in this manual, and specifically excludes hoists subject to normal wear, abuse, improper installation, improper or inadequate maintenance, hostile environmental effects and unauthorized repairs/modifications.

We reserve the right to change materials or design if, in our opinion, such changes will improve our product. Abuse, repair by an unauthorized person, or use of replacement parts not supplied by Columbus McKinnon voids the guarantee and could lead to dangerous operation. For full terms of sale, see sales order acknowledgement. Also, refer to the back cover for Limitations of Warranties, Remedies and Damages, and Indemnification and Safe Operation.

## UNPACKING

After opening the carton, the hoist should be carefully inspected for damage which may have occurred during shipment or handling. Check the hoist frame for dents or cracks and inspect the load chain for nicks and gouges. If shipping damage has occurred, refer to the packing list envelope on the carton for claim procedure.

### WARNING

Operating a unit with obvious external damage may cause load to drop and that may result in personal injury and/or property damage.

#### TO AVOID INJURY:

Carefully check unit for external damage prior to installation.

## INSTALLATION

Before installing the hoist:

1. Determine the weight of the load that is to be lifted or moved and make sure it does not exceed the rated load of the hoist.
2. Make sure the support or sling to which the upper hook is attached is strong enough to hold several times the weight of the load to be lifted or moved. Be sure the hoist is solidly held in the uppermost part of the upper hook and the latch is closed and not in contact with the support or sling.

### WARNING

Attaching the hoist to an inadequate support may allow the hoist and load to fall and cause injury and/or property damage.

#### TO AVOID INJURY:

Make sure the structure has sufficient strength to hold several times the hoist and its rated load.

3. The area in which the hoist is installed must provide sufficient room for:
  - The operator to operate the hand chain.
  - The operator and other personnel to stand clear of the load at all times.
  - Firm footing for the operator.
  - Clearance between the hoist frame and any object.
  - The frame to be free to swivel on the upper hook.

### WARNING

The unit must only be assembled in atmospheres without an explosion hazard, since it cannot be excluded that during assembly spark formation caused by handling of tools may occur. Non-sparking explosion-protected tools must be used.

It is recommended that a verification measurement be carried out!



## OPERATING INSTRUCTIONS

After mounting and before placing in service, check the hoist for proper operation. To operate the hoist, pull on the hand chain as indicated below.

### **WARNING**

If not used as directed, hoist may cause injury.

#### **TO AVOID INJURY:**

Use only as directed below. Read all instructions before operating the Yale Yalelift 360™ ATEX hand chain hoist.

Operate the hoist with no load and then a light load of approximately 50 pounds per load-supporting parts of chain, to make sure it operates properly and the brake holds the load when the hand chain is released, then operate with a rated load as shown on the nameplate.

### **GENERAL**

1. The hoist must always be rigged to lift in a straight line from hook to hook. The hoist must always be free to swivel on the upper hook. Under no condition should the hoist frame be allowed to bear on any support when in use, as this would cause bending of the hook or frame and damage the unit.
2. When preparing to lift or move a load, be sure that the attachments to both hooks are firmly seated in the saddles of the hooks. Avoid off center loading of any kind especially loading on the tip of the hook. Also, observe that the chain hangs straight (without twist) from hoist to lower hook. The lower hook should be free to swivel as well.
3. When lifting, raise the load only enough to clear the floor or support, and check to be sure brake will hold load and that attachments to the load are firmly seated. Continue the lift only after you are assured the load is free of all obstructions.
4. Do not load beyond the rated capacity of the hoist. Rated capacity can be achieved with the following hand chain pulls:

Hoist Capacity (Tonnes)	Hand Chain Pull to Lift Rated Load	
	lbf	(daN)
¼	18	8
½	34	15
1	67	30
1½	43	19
2	56	25
3	47	21
4	61	27
5	49	22
6	58	26
8	79 (x2)	35 (x2)
10	99 (x2)	44 (x2)
12	119 (x2)	53 (x2)

NOTE: The minimum load must be 10% of the rated load

Since these hand chain pulls can easily be applied by one person, under no circumstances should more than one person operate the hoist hand chain.

This hoist is equipped with a load limiting device. The presence of this device does not authorize the application of overloads. Always select a hoist whose load rating is in excess of the load to be handled. If the handwheel slips while operating, reduce load or use correct capacity hoist.

#### **NOTE:**

The load limiting device incorporated in this hoist is effective only when the overload is being lifted or pulled through the operation of the handwheel. It will not protect against externally applied overloads.

5. Do not wrap load chain around the load or bring the load in contact with the hoist. Doing this will result in the loss of the swivel effect of the hook which could mean twisted chain and a jammed liftwheel. The chain could be damaged at the hook.
6. Stand clear of all loads and avoid moving a load over the heads of other personnel. Warn personnel of your intention to move a load in their area.
7. Do not leave the load in the air unattended.
8. Do not lower the hook to a point where the chain becomes taut between the liftwheel and loose end connector

### **WARNING**

Power operation may result in structural damage or premature wear that may cause a part to break and allow the load to fall.

#### **TO AVOID INJURY:**

Operate Yale Yalelift 360™ ATEX hand chain hoist using hand power only.

9. Do not run the lower hook block into the hoist frame. Frame and/or chain guide damage may result.
10. The hoist has been designed for manual operation only.
11. Do not use this or any other overhead materials handling equipment for lifting persons.
12. Do not allow the load to bear against the hook latch. The latch is to help maintain the hook in position while the chain is slack before taking up slack chain.
13. Never operate the hoist when flammable materials or vapors are present. Sharp contact between metal parts can produce sparks that can cause a fire or explosion.
14. **STAY ALERT!** Watch what you are doing and use common sense. Do not use the hoist when you are tired, distracted or under the influence of drugs, alcohol or medication causing diminished control.

### **WARNING**

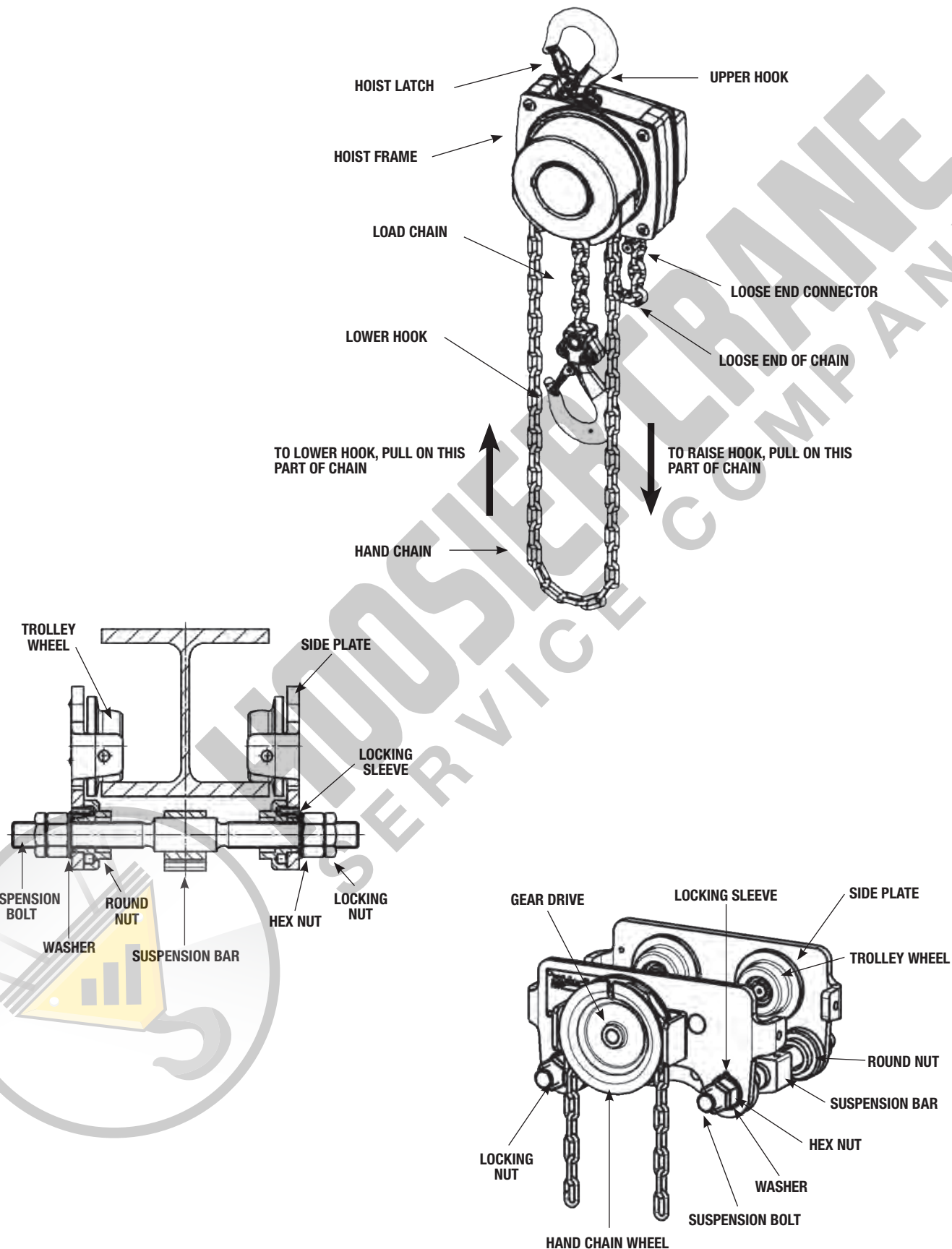
Allowing the load to bear against the hook latch and/or hook tip can result in loss of load.

#### **TO AVOID INJURY:**

Do not allow the load to bear against the hook latch and/or hook tip. Apply load to hook bowl or saddle only.

## HOIST & TROLLEY COMPONENT OVERVIEW

Figure 2 – Main Parts of Yale Yalelift 360™ ATEX hand chain hoist and integrated trolley



# MAINTENANCE

## INSPECTION

To maintain continuous and satisfactory operation, a regular inspection procedure must be initiated so that worn or damaged parts can be replaced before they become unsafe. The intervals of inspection must be determined by the individual application and are based upon the type of service to which the hoist will be subjected. The inspection of hoists is divided into two general classifications designated as "frequent" and "periodic."

### Frequent Inspections:

These inspections are visual examinations by the operator or other designated personnel. The frequent inspections are to be performed daily and shall include the following items (no records required):

- Braking mechanisms for evidence of slippage daily.
- Load Chain for lubricant, wear, damaged links or foreign material-daily (See pages 11, 12 & to 15).
- Cracks or damage to housing, abnormal noises or operation, damaged hooks (see Hook Inspection below).
- All capacity and warning labels legible and present.

Any deficiencies noted are to be corrected before the hoist is returned to service.

### Periodic Inspections:

These are inspections by an appointed person who makes records of apparent external conditions to provide the basis for a continuing evaluation. For normal service, the periodic inspections are to be performed yearly and for heavy service, the periodic inspections are to be performed semi-annually.

Due to the construction of the hoist, it will be necessary to partially disassemble the unit to perform the periodic inspections. The periodic inspections are to include those items listed under frequent inspections as well as the following:

- Chain for excessive wear or stretch (See pages 11 to 12).
- Worn, cracked or distorted parts such as hook blocks, hand chain guides, chain guide, stripper, loose end connector, shafts, gears, bushings and bearings.
- Inspect for wear on the tip of the driver, stops on handwheel and pockets of the liftwheel and handwheel.
- Loose or missing screws, nuts, pins or cotter pins.
- Inspect brake components for worn, glazed or contaminated brake disc and scoring of the brake hub and brake plate. If the thickness of the friction washer is less than 1/32 inch, it should be replaced.
- Replace missing or damaged warning labels.
- Corroded, stretched or broken brake spring.
- Hooks-dye penetrant, magnetic particle or other suitable crack-detecting inspections should be performed at least once a year, if external conditions indicate there has been unusual usage.

Any deficiencies noted are to be corrected before the hoist is returned to service. Also, the external conditions may show the need for more detailed inspection which, in turn, may require the use of nondestructive-type testing.

Any parts that are deemed unserviceable are to be replaced with new Columbus McKinnon parts before the unit is returned to service. It is very important that the unserviceable parts be destroyed to prevent possible future use as a repair item and properly disposed of.

### Hook Inspection

Hooks damaged from chemicals, deformation or cracks, or that have a twist, excessive opening or seat wear, must be replaced. Also, hooks that are opened to the extent that the latch does not engage the tip must be replaced. Any hook that is twisted or has excessive throat opening indicated abuse or overloading of the hoist. Other load sustaining parts should be inspected for damage.

Check to assure the latch is not damaged or bent and that it operates properly. It should have sufficient spring pressure to keep it tightly against the tip of the hook and allow it to spring back to the tip when released. If the latch does not operate properly, replace the latch.

Hooks shall swivel freely under no load conditions. If there is any binding, the hooks must be replaced. Also, replace hook if opening is greater than "C" or if the thickness at "B", "N", "W", or "V" is less than the dimensions listed in the chart (see Figure 3).

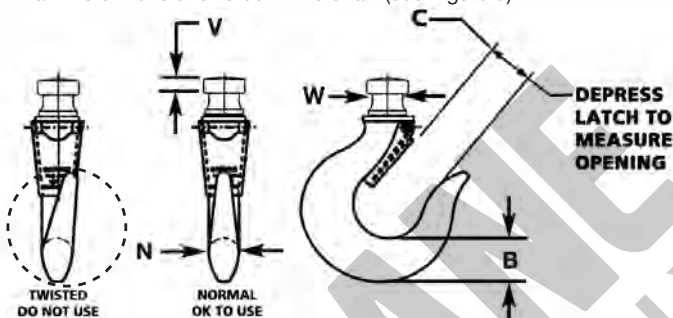


Figure 3 - Hook Inspection

Capacity (ton)	Critical Hook Dimensions in. (mm)				
	B	C	N	V	W
¼, ½ & 1	0.87 (22)	1.14 (29)	0.75 (19)	0.24 (6)	0.59 (15)
1½ & 2	1.50 (38)	1.58 (40)	1.18 (30)	0.43 (11)	0.87 (22)
3 & 4	1.77 (45)	1.85 (47)	1.46 (37)	0.47 (12)	1.10 (28)
5 & 6	2.68 (68)	2.68 (68)	1.97 (50)	0.67 (17)	1.38 (35)
8, 10 & 12	3.35 (85)	2.52 (64)	2.21 (56)	0.51 (13)	1.77 (45)

### TROLLEY (YLITP/YLITG MODELS)

Check to make sure the side plates are parallel to each other. Also, all wheels must be in contact with the beam flange.

**ATTENTION: The trolley must never be used on beams with flange widths that exceed the maximum adjustable width of the trolley.**

Check the travel path before starting work to allow for unit to run faultless on the beam. Any existing obstacles must be removed.

In addition, check the correct fastening and position of the end stops.

### LOAD CHAIN

Chain should feed smoothly into and away from the hoist. If chain binds, jumps or is noisy, first clean and lubricate it (See next page). If trouble persists, inspect chain and mating parts for wear, distortion or other damage.

### Chain Inspection

First clean chain with a non-caustic/non-acid type solvent and make a link by link inspection for nicks, gouges, twisted links, weld spatter, corrosion pits, striations (minute parallel lines), cracks in weld areas, wear and stretching. Chain with any one of these defects must be replaced.

Slack the portion of the chain that normally passes over the liftwheel. Examine the interlink area for the point of maximum wear (polishing). Measure and record the stock diameter at this point of the link. Then measure stock diameter in the same area on the link that does not pass over the liftwheel (use the link adjacent to the loose end connector for this purpose). Compare these two measurements. If the stock diameter of the worn link is 0.010 inch, or more, less than the stock diameter of the unworn link, the chain must be replaced.

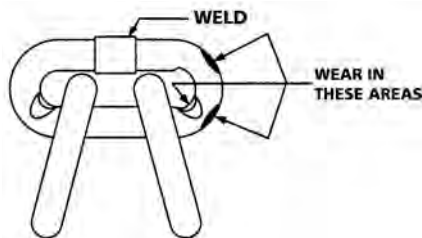


Figure 4 - Chain Inspection



## MAINTENANCE (CONTINUED)

Also check chain for stretch and wear using a vernier caliper as shown in Figure 5. Select an unused, unstretched section of chain (usually at the loose end) and measure and record the length over 11 chain links (pitches). Measure and record the same length on a worn section of chain. If the result (amount of stretch and wear) is greater than 0.145 inch, the chain must be replaced.

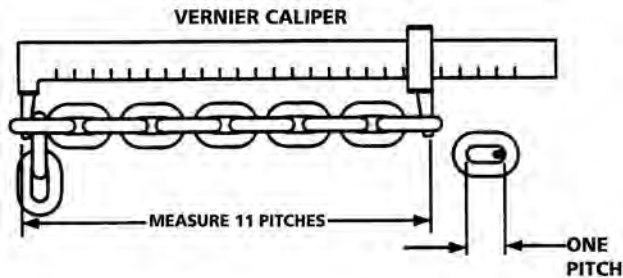


Figure 5 - Chain Inspection

Use only a "Knife-Edge" caliper to eliminate the possibility of a false reading by not measuring full pitch length.

### **WARNING**

Using other than Columbus McKinnon supplied load chain may cause the chain to jam in the hoist and/or allow the chain to break and the load to drop.

#### **TO AVOID INJURY:**

Due to size requirements and physical properties, use only Columbus McKinnon supplied load chain in the Yale Yalelift 360™ ATEX hand chain hoist.

Worn chain can be an indication of worn hoist components. For this reason, the hoist's chain guide, stripper and liftwheel should be examined for wear and replaced as necessary when replacing worn chain (See "DISASSEMBLY AND ASSEMBLY").

Also, the load chain is specially heat treated and hardened and should never be repaired.

**IMPORTANT:** Do not use replaced chain for other purposes such as lifting or pulling. Load chain may break suddenly without visual deformation. For this reason, cut replaced chain into short lengths to prevent use and then dispose of it.

**NOTE:** The above method of inspecting load chain can also be used to inspect the hand chain for stretch and wear.

#### **Chain Lubrication**

A small amount of lubricant will greatly increase the life of load chain. Do not allow the chain to run dry. Keep it clean and lubricate at regular intervals with Lubriplate® Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant. Normally, weekly lubrication and cleaning is satisfactory, but under hot and dirty conditions, it may be necessary to clean the chain at least once a day and lubricate it several times between cleanings.

When lubricating the chain, apply sufficient lubricant to obtain natural run-off and full coverage, especially in the interlink area.

### **WARNING**

Used motor oils contain known carcinogenic materials.

#### **TO AVOID INJURY:**

Never use used motor oils as a chain lubricant. Only use Lubriplate® Bar and Chain Oil 10-R as a lubricant for the load chain.

## LUBRICATION

Hoist normally requires no additional lubrication except when it had been disassembled for cleaning or repairs.

**IMPORTANT:** Brake is designed to operate dry. Do not use any grease or lubricant on the braking surfaces. When lubricating parts adjacent to the brake, do not use an excessive amount of lubricant which could seep onto the brake surfaces.

### **WARNING**

Using any grease or lubricant on the braking surfaces will cause brake slippage and loss of load control which may result in injury and/or property damage.

#### **TO AVOID INJURY:**

Do not use any grease or lubricant on braking surfaces. The brake is designed to operate dry.

If hoist is disassembled for service, repair or inspection, remove and clean existing grease from unit and replace with approximately 1 oz. of Poliplex 2 (Century Lubricants Co.) grease or equal lubricant to the exterior surface of the drive shaft, gears, internal thread of brake hub, surface of liftwheel bushings (1/2 ton unit), bushings in the gear side plate and gear cover, internal and external surfaces of handwheel bushings and rim of handwheel cover.

**IMPORTANT:** To assure long life and top performance, be sure to lubricate the various parts of the hoist using the lubricants specified above. If desired, these lubricants can be purchased from Columbus McKinnon (See Figure 7, page 15).

## REPLACING LOAD CHAIN

To replace the load chain, remove the lower hook block from the chain. Disconnect the chain from the loose end connector and operate the hoist in the lowering direction to run the chain out of the hoist. Feed a length of soft wire up and over the liftwheel. Attach the wire to the new load chain so that the chain will be entering the center of the hoist frame. Position the chain so that the first link to engage the liftwheel is an upstanding link and the weld on all upstanding links will be away from the liftwheel. Pull on the wire until the chain engages the liftwheel. Rotate the handwheel until the chain comes out on the loose side of the hoist. Attach the chain to the loose end connector and attach the lower hook block assembly to the chain so that the lower hook is directly below the upper hook.

## DISASSEMBLY AND ASSEMBLY

The parts list and exploded view on pages 15 to 27 show the general arrangement and name of the parts of the Yale Yalelift 360™ ATEX hand chain hoist. These should be used when disassembling and reassembling the hoists so that all parts are properly installed.

1. To inspect or replace parts of the load brake system, it is necessary to partially disassemble the hoist. Remove the hand chain wheel cover and slide it down the hand chain. Lift the hand chain out of the hand chain wheel pockets. Remove the cotter pin, castle nut and washer from the drive shaft. Remove hand chain wheel by turning hand chain wheel counter clockwise. Inspect the friction surface of the brake hub and replace it if the surface excessively scored. (see page 13, "HANDWHEEL OVERLOAD CLUTCH ASSEMBLY"). Slide front brake disc, ratchet disc assembly and rear brake disc from pressure disk. Remove retaining ring and remove pressure disc by turning counter clockwise. Inspect both brake discs and replace if excessive wear, scoring, glazing or contamination is found. If brake discs are worn down to the following thickness, replacement is required:

Capacity	Thickness Min. in. (mm)
1/4, 1/2, 1, 1 1/2 & 2	.043 (1.09)
3, 4, 5, 6, 8, 10 & 12	.063 (1.60)

Inspect ratchet disc assembly and pressure disc friction surfaces, replace if excessively scored.

After the brake discs are inspected or replaced, reassemble the hoist in reverse to the order given above.



## MAINTENANCE (CONTINUED)

2. To inspect or replace the liftwheel, chain guide or stripper, it is necessary to disassemble the hoist. Remove the load chain (See "REPLACING LOAD CHAIN" on previous page) and then remove the handwheel cap and the handwheel cover support. Lift off the handwheel cover and slide it down the hand chain. Lift the hand chain out of the hand wheel pockets. Remove cotter pin, castle nut and washer from the drive shaft. Remove handwheel overload clutch assembly by turning handwheel counter clockwise. Slide front brake disc, ratchet disc assembly and rear brake disc from pressure disk. Remove retaining ring and then remove pressure disc by turning counter clockwise. Remove the handwheel side plate, by sliding it over drive shaft. Remove the stripper and chain guide. Examine the stripper, chain guide, liftwheel and loose end connector for wear and damage.

If the stripper, chain guide and/or loose end connector are worn or damaged they should be replaced. If the liftwheel is not worn or damaged, reassemble the hoist in reverse to the order given above. If the liftwheel is to be replaced, continue to disassemble the hoist.

**NOTE:** Two points of caution to be observed in disassembly and assembly of the gears:

- a. Loose rollers are used in various locations in some units. Care must be taken so as to not lose or misplace these.
- b. For proper operation, the correct number of rollers must be installed at the rotating points. Applying grease to the rollers will help hold them in position during assembly.

Remove the gear cover, end covers and gears. Remove drive shaft by sliding it out and remove locking ring. Remove washer and liftwheel gear. Remove the liftwheel and replace it. The liftwheel may require pressing out of liftwheel bearings. Check the gears and other parts for excessive wear, cracks and distortion. Replace parts as necessary and then reassemble the unit in reverse to the order in which it was disassembled. Install the load chain per manual section "REPLACING LOAD CHAIN", on previous page. After the hoist is completely reassembled, it must be tested for proper operation (See "TESTING", page 15).

### 3. HANDWHEEL OVERLOAD CLUTCH ASSEMBLY:

**NOTE:** Slip clutch is an option on Yale Yalelift 360™ ATEX hoist (not standard) To inspect or replace handwheel overload clutch assembly, it is necessary to partially disassemble the hoist. Remove the handwheel cap and the handwheel cover support. Lift off the handwheel cover and slide it down the hand chain. Lift the hand chain out of the handwheel pockets. Remove cotter pin, castle nut and washer from the drive shaft. Remove handwheel overload clutch assembly by turning handwheel counter clockwise. Use spanner socket tool (available from Columbus McKinnon) to remove groove nut from handwheel brake hub. Slide Belleville spring washer, pressure plate front brake disc, handwheel and rear brake disc from handwheel brake hub. Inspect both brake discs and replace if excessive wear, scoring, glazing or contamination is found. If brake disc is worn down to the following thickness, replacement is required:

Capacity (ton)	Thickness Min. in. (mm)
¼, ½, 1, 1½ & 2	.043 (1.1)
3, 4, 5, 6, 8, 10 & 12	.063 (1.6)

Inspect pressure plate, handwheel and handwheel brake hub friction surfaces, replace if excessively scored.

Replace parts as necessary and then reassemble the unit in reverse to the order in which it was disassembled. Once the handwheel overload clutch is assembled, tighten/torque the groove nut with the spanner socket tool (available from Columbus McKinnon).

The handwheel overload clutch should be adjusted to approximately 125% of rated capacity. This setting must be checked with the handwheel overload clutch assembled into the hoist (See "ADJUSTMENT OF LOAD LIMITER").

4. To inspect or replace the pawl or pawl spring, it is necessary to partially disassemble the hoist. Remove the hand chain wheel cover and slide it down the hand chain. Lift the hand chain out of the hand chain wheel pockets. Remove the cotter pin, castle nut and washer from the drive shaft. Remove hand chain wheel by turning hand chain wheel counter clockwise.

Remove retaining ring, pawl, and pawl spring from handwheel side plate assembly. Inspect pawl and pawl spring for wear, replace if worn. Replace parts as necessary and then reassemble the unit in reverse to the order in which it was disassembled. After the hoist is completely reassembled, it must be tested for proper operation (See "TESTING", page 15).

5. To replace hook latch, grind off head of rivet and drive it out. Remove and discard the latch and spring. Attach the new latch and spring using the roll pin provided in the latch kit.

## ADJUSTMENT OF LOAD LIMITER

**NOTE:** Slip clutch is an option on Yale Yalelift 360™ ATEX hoist (not standard)

To adjust the load limiter:

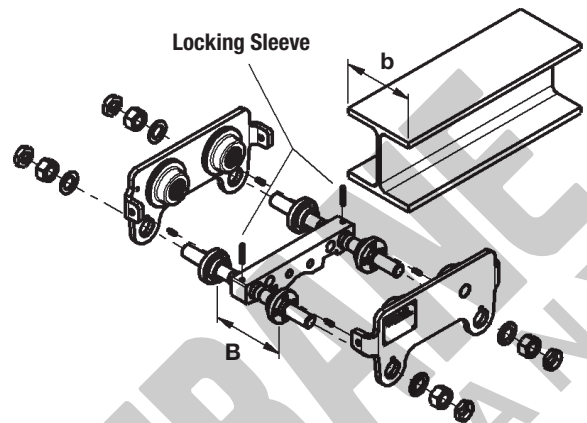
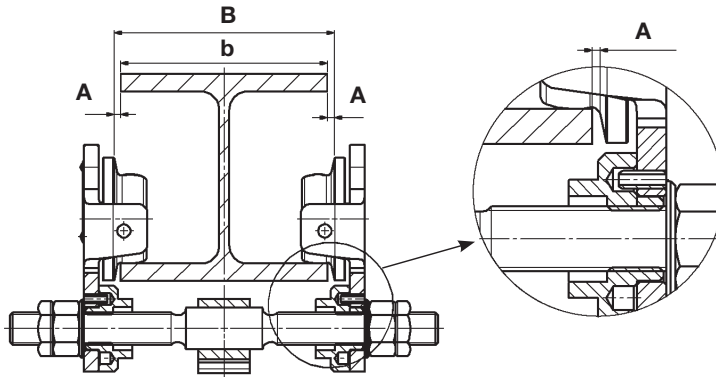
1. Remove the hoist from the supporting structure and lay it on a flat working surface with the handwheel facing up.
2. Remove the three screws securing the plastic center cap and remove the cap from the handwheel cover.
3. Block the load chain by inserting a screwdriver or pin through the load chain just below the hoist frame. Operate the handwheel in the up direction to remove the slack from the load chain, closing and locking the brake.
4. Change the adjustment of the load limiter by tightening the groove nut with the spanner socket tool (available from Columbus McKinnon.) to increase the setting or by loosening the groove nut to decrease the setting.

Capacity (ton)	Spanner Socket Tool Product Code
¼, ½, 1	00401422
1½, 2, 3, 4, 5, 6, 8, 10 & 12	00401424

5. Perform required load tests after adjustment. (See "TESTING", page 15). Revise the adjustment if necessary. **NOTE:** The hoist should not be able to lift 150% of the rated capacity load if the load limiter has been properly adjusted.
6. Replace the center cap in the handwheel cover.

## MAINTENANCE (CONTINUED)

### TROLLEY DISASSEMBLY AND ASSEMBLY



#### YALELIFT 360™ ATEX ITP/ITG, UP TO 5 TON

The trolleys are built to fit beam range A or B which is indicated on the identity plate. Before installation, make sure that the track beam width is within this beam range.

The further procedure for assembly of the unit on the track beams depends on whether the track beam has an accessible open end or not. If this is the case, it is recommended that the unit be pre-assembled on the ground and then be pushed onto the open end of the beam.

1. Unscrew locking nuts and hexagonal nuts from the suspension bolt and remove both side plates from the trolley.
2. Measure flange width "b" of the track beam.
3. Adjust or pre-adjust dimension "B" between the outer flanges of the round nuts on the four free threaded ends of the suspension bolts. Make sure that the four drill holes in the round nuts face outwards. Select dimension "B" between the outer flanges of the round nuts on the suspension bolts in such a way that it corresponds to flange width "b" plus 4 mm. Ensure that the suspension bar is centered between the round nuts.
4. Assembly of one side plate: The roll pins fitted to the side plate must be seated in one of the four drill holes of the round nuts. If necessary the position of the round nuts must be slightly re-adjusted.
5. Position the washer and tighten the hexagonal nuts. Finally screw on the locking nuts by hand and tighten by ¼ to ½ rotation.

**ATTENTION:** The locking nuts must always be fitted!

6. Place the second side plate onto the suspension bolts without tightening. Then screw on washers, hexagonal nuts and locking nuts without tightening to facilitate assembly.
7. Place the entire pre-assembled unit onto the beam.

**ATTENTION:** For Yalelift ITG models, pay attention to the position of the gear drive.

8. Insert the roll pins driven into the second side plate in one of the appropriate four drill holes of the round nuts. If necessary the round nuts must be slightly re-adjusted.
9. Tighten the hexagonal nuts on the second side plate. Finally screw on the locking nuts by hand and tighten by ¼ to ½ rotation.

**ATTENTION:** The locking nuts must always be fitted!

10. Check the fitted unit:

- a) The lateral play dimension "A" must not exceed 2 mm between the wheel flange and the outer edge of the beam.
- b) The suspension bar must be positioned centrally between the side plates.
- c) All nuts and locking nuts must be firmly tightened.

#### YALELIFT 360™ ATEX ITG 5 & 6 TON

1. Measure the flange width of the beam.
2. Evenly distribute the spacer sleeves and spacer washers on both sides of the suspension bolt accordingly. A clearance ("A") of 2 mm between the wheel flange and the beam flange must be maintained (inner dimension = flange width + 4 mm).
3. After adjustment of the inner dimension, evenly distribute the remaining spacer sleeves and spacer washers on the outside of the side plates on the suspension bolt. In each case, at least 3 spacer washers and 1 spacer sleeve must be mounted between the side plates and the castle nut.  
*Tip: For easier assembly, tighten one side plate. Observe the required position of the drive side. Only slide on the other side plate without tightening.*
4. Then lift the entire unit onto the track beam and firmly tighten all castle nuts.
5. Secure all castle nuts with cotter pins.

**ATTENTION:** A trolley must never be used on a beam with a flange width that exceeds the maximum adjustable width of the trolley (observe total clearance of 5 mm, depends on model) or with a profile which does not correspond to the profile the trolley has been designed for.

#### SHORTEN OR EXTEND THE HAND CHAIN

Adjust the length of the hand chain so that the distance of the lower end to the floor is between 20 to 40 in. (500 to 1000 mm).

**NOTE:** For safety reasons, hand chain links may only be used once.

1. Look for the non-welded link of the hand chain, bend to open and discard it.
2. Shorten or extend the chain to the required length.

**ATTENTION:** Always remove or add an even number of chain links.

3. Use a new link to close the loose chain ends by bending it (for extending the hand chain, two new chain links are required).

**ATTENTION:** Do not twist hand chains while fitting.

## MAINTENANCE (CONTINUED)

### LUBRICATION

If hoist is disassembled for service, repair or inspection, remove and clean existing grease from unit and replace with approximately 1 oz. of Poliplex 2 (Century Lubricants Co.) grease or equal lubricant to the exterior surface of the drive shaft, gears, internal thread of brake hub, surface of liftwheel bushings (1/2 ton unit), bushings in the gear side plate and gear cover, internal and external surfaces of handwheel bushings and rim of handwheel cover.

### GEARS

The gears do not have to be timed and as a result, they do not have to be oriented in a certain position during assembly. However, for proper operation of the ¼, ½, 1, 1½, 2, 3, 4, 5, 6, 8, 10 and 12 ton units, one gear marked "A" and one gear marked "B" must be used.

### PREVENTIVE MAINTENANCE

In addition to the inspection procedures, a preventative maintenance program should be established to prolong the useful life of the hoist and maintain its dependability and continued safe use. The program should include the periodic inspections with particular attention being paid to the lubrication of various components using the recommended lubricants (See Figure 7).

### TESTING

**OPERATIONAL TEST:** Prior to initial use, all repaired or used hoists that have not been operated for the previous 12 months shall be tested by the user for proper operation.

Test the unit first in the unloaded state and then with a light load of 50 lbs. times the number of load supporting parts of load chains to be sure it operates properly and the brake holds the load when

the hand chain is released. A load test is not required.

**LOAD TEST:** In addition, hoists in which load sustaining parts have been replaced must be tested with 125% of rated capacity by or under the direction of a designated person and a written report prepared for record purposes.

If the hoist was disassembled, Columbus McKinnon recommends performing a load test and an operational test.

**NOTE:** Because this hoist is equipped with a load limiting device occasional slipping of the handchain wheel may occur when testing with 125 percent of rated load.

**NOTE:** For additional information on Inspection and Testing refer to ASME B30.16, "Overhead Hoists", obtainable from ASME Order Department, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300, U.S.A.

### RECOMMENDED SPARE PARTS

Pawl Kit	Upper Latch Kit
Ratchet Kit	Lower Latch Kit
Upper Hook Assembly Kit	Load Chain
Lower Hook Assembly Kit	Hand Chain

### WARNING

Alterations or modifications of equipment and use of any parts other than Yale Yalelift 360™ ATEX hand chain hoist repair parts can lead to dangerous operation and injury.

#### TO AVOID INJURY:

Do not alter or modify equipment. Only use replacement parts provided by Columbus McKinnon.

INSPECTOR'S REPORT			
ITEM	REMARKS (LIST DEFICIENCIES AND RECOMMENDED ACTION)		
Inspector's Signature	Date Inspected	Approved by	Date

Figure 6 - Recommended Inspector's Report

RECOMMENDED LUBRICATION SCHEDULE* Yale Yalelift 360™ ATEX hand chain hoist						
KEY NO. (SEE PAGES 15 TO 21)	COMPONENT	TYPE OF LUBRICANT	***ORDER PART NO.	TYPE OF SERVICE AND FREQUENCY OF LUBRICATION		
656-28	Load Chain	Lubriplate® Bar and Chain Oil 10-R**	28619 (1 gal. can)	HEAVY	NORMAL	INFREQUENT
				Daily	Weekly	Monthly
656-11 656-12 656-13 656-17	Gears and Bearing Sur- faces of Upper and Lower Hook Knobs	Poliplex 2	28618 (1 lb. can)	When hoist is disassembled for cleaning or repairs		

\* This lubrication schedule is based on a hoist operating in normal environment conditions. Hoists operating in adverse atmospheres containing excessive heat, corrosive fumes or vapors, abrasive dust, etc., should be lubricated more frequently.

\*\* The lower and upper explosive limits are 0.9% and 7% for Lubriplate® Bar and Chain Oil 10-R. If you use a similar lubricant, make sure the boiling point, flash point and ignition temperatures are higher than the maximum surface temperature of the equipment, which is T4 = 135°C.

\*\*\* See page 19 for ORDERING INSTRUCTIONS.

Figure 7 - Recommended Lubrication Schedule

# MAINTENANCE (CONTINUED)

## INSPECTION AND MAINTENANCE CHECK LIST HAND OPERATED LEVER HOIST

Type of Hoist \_\_\_\_\_ Capacity (Tons) \_\_\_\_\_  
 Location \_\_\_\_\_ Original Installation Date \_\_\_\_\_  
 Manufacturer \_\_\_\_\_ Manufacturer's Serial No. \_\_\_\_\_

Item	Frequency of Inspection		Possible Deficiencies	OK	Action Required
	Frequent	Periodic			
	Daily (prior to operation)	Every 3 Months to Annually as defined per ASME B30.16			
Brake Mechanism	*	*	Slippage or excessive drift. Worn, glazed or contaminated friction discs. Thickness of brake ratchet assembly less than 7mm.		
Handwheel	*	*	Binding and does not move freely.		
Load Chain	*	*	Inadequate lubrication, excessive wear or stretch, cracked, damaged or twisted links, corroded or clogged with foreign material.		
Hooks	*	*	Excessive throat opening, twisted, damaged or non-operating hook latch, chemical damage. Cracks (Use dye penetrant, magnetic or other suitable detection method at least once a year).		
Lower Hook Block, Upper Hook Block, Upper Hook Pin, Chain Guide, Bushings, Gears, Drive Shaft, Brake Hub and Brake Plate		*	Cracks, distortion, excessive wear, corrosion or build-up of foreign material.		
Tip of Driver, Inboard and Outboard Stops on Handwheel and Outboard Lugs on Brake Hub		*	Cracks, distortion, excessive wear, corrosion or build-up of foreign material.		
Pockets of Liftwheel, Stripper and Side Plates		*	Cracks, distortion, excessive wear, corrosion or build-up of foreign material.		
Nuts, Screws, Pins and Cotter Pin		*	Cracks, bending, loose, stripped threads.		
Brake Spring		*	Corrosion, stretched or broken.		
Loose End Connector		*	Missing, cracked, not secured to chain, not properly positioned.		
Nameplate, Warning Labels and Free Chaining		*	Missing, Damaged or illegible.		
<b>NOTE:</b> Refer to Maintenance and Inspection sections of this manual for further details.					

**NOTE:** Survey at manufacturer for units in potentially explosive areas must take place every 3 years by a competent person or an authorized service partner.

### FREQUENCY OF INSPECTION

**Frequent** - Indicates items requiring inspection daily or before each use. These inspections may be performed by the operator if properly designated.

**Periodic** - Indicates items requiring inspection every three months. Inspections to be performed by or under the direction of a properly designated person. The exact period of inspection will depend on frequency and type of usage. Determination of this period will be based on the user's experience. It is recommended that the user begin with a quarterly inspection and extend the periods to semi-annually or annually based on the user's quarterly experience.

**NOTE:** This inspection and maintenance check list is in accordance with our interpretation of the requirements of the safety standard for overhead hoists: ASME B30.16. However, it is the ultimate responsibility of the employer/user to interpret and adhere to the applicable requirements of this safety standard.

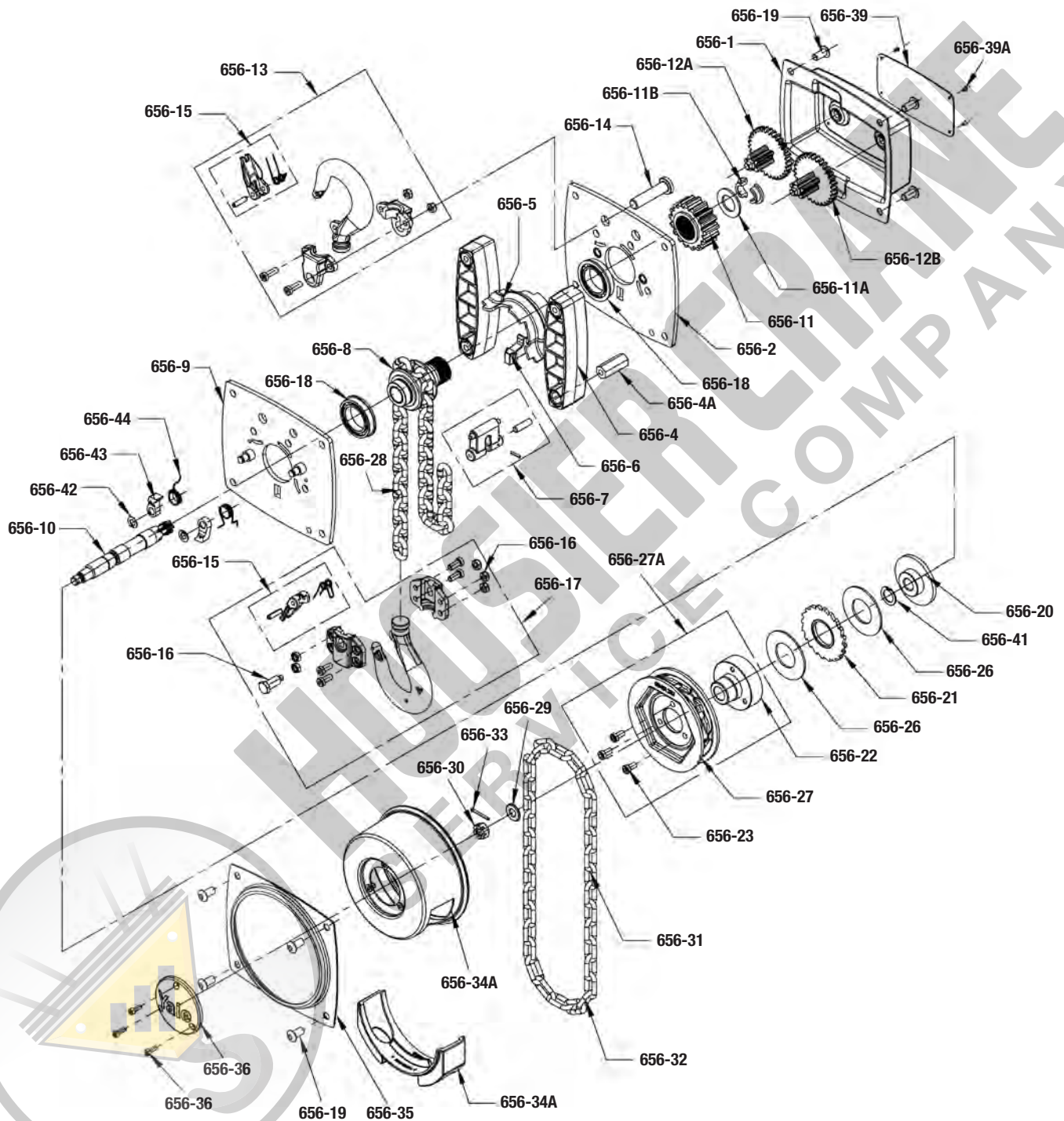
Figure 9 — Recommended Inspection and Maintenance Check List



# TROUBLESHOOTING CHART

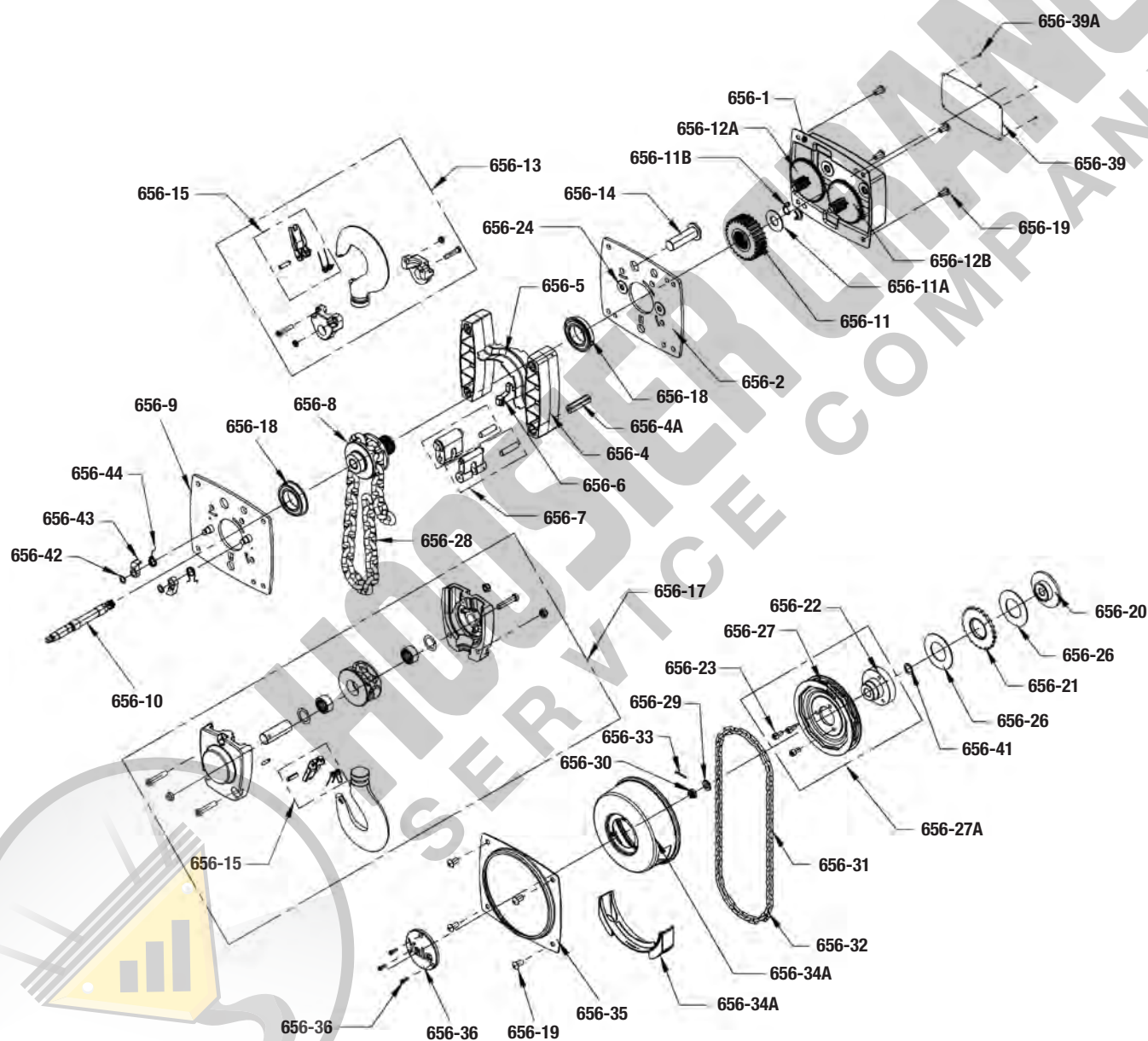
Symptom	Possible Cause(s)	Corrective Action
1. Hoist is hard to operate in either direction.	<p>A. Load chain worn long to gauge, thus binding between liftwheel and chain guide.</p> <p>B. Load chain rusty, corroded or clogged with foreign matter such as cement or mud.</p> <p>C. Bushings clogged with matter such as cement or dust.</p> <p>D. Lever binding.</p> <p>E. Brake parts corroded or clogged with foreign matter.</p> <p>F. Liftwheel pockets clogged with foreign matter or worn excessively causing chain to bind between liftwheel and chain guide.</p> <p>G. Liftwheel twisted or bent - gear teeth bent.</p>	<p>A. Check chain, (See pages 9 and 10) and replace if worn excessively.</p> <p>B. Clean chain by tumble polishing or using a non-acid or non-caustic type solvent. Check chain for gouges, damaged or bent links. Lubricate with Lubriplate® Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant.</p> <p>C. Disassemble and clean liftwheel bushings and bushings in gear cover and side plate (gear side). Any parts worn excessively should be replaced.</p> <p>D. Clean by removing any foreign matter which may be between the lever and the brake cover.</p> <p>E. Disassemble brake and clean thoroughly (by wiping with a cloth - not by washing in a solvent). Replace ratchet assembly if too gummy, worn or scored. Keep brake surfaces clean and dry.</p> <p>F. Clean out pockets and use if not worn excessively. Replace liftwheel if pockets are worn.</p> <p>G. Excessive overload had been applied. Replace damaged parts.</p>
2. Hoist is hard to operate in down direction.	<p>A. Brake parts corroded or clogged with foreign matter.</p> <p>B. Brake not properly adjusted.</p> <p>C. Chain binding.</p>	<p>A. Disassemble brake and clean thoroughly. (By wiping with a cloth- not by washing in a solvent). Replace brake disc if gummy, visibly worn or coated with a foreign matter. Keep brake disc and brake surfaces clean and dry.</p> <p>B. Readjust brake (See pages 9 and 10).</p> <p>C. See Items 1A, 1B and 1C.</p>
3. Hoist is hard to operate in the hoisting direction.	A. Chain binding.	A. See Items 1A, 1B and 1C.
4. Hoist will not operate in either direction.	<p>A. Driver or stops on handwheel broken.</p> <p>B. Gears jammed</p>	<p>A. Replace damaged part.</p> <p>B. Inspect for foreign matter in gear teeth.</p>
5. Hoist will not operate in the lowering direction	<p>A. Locked brake due to a suddenly applied load, shock load, or load removed by means other than by operating unit in the lowering direction.</p> <p>B. Chain binding</p> <p>C. Lower hook all the way out. Load chain fully extended.</p>	<p>A. With hoist under load keep chain taut, pull sharply on hand chain in the lowering direction to loosen brake.</p> <p>B. See Items 1A, 1B and 1C.</p> <p>C. Chain taut between the liftwheel and loose end connector. Operate unit in hoisting direction only.</p>
6. Hoist will not operate in the hoisting direction	<p>A. Chain binding</p> <p>B. Overload</p>	<p>A. See Items 1A, 1B and 1C.</p> <p>B. If handwheel slips while operating, reduce load or use correct capacity hoist.</p>
7. Hoist will not hold load in suspension.	<p>A. Lower hook or load side of chain on wrong side of liftwheel.</p> <p>B. Brake not properly adjusted.</p> <p>C. Driver or stops on handwheel broken.</p> <p>D. Worn brake parts.</p> <p>E. Oily, dirty or corroded brake friction surfaces.</p>	<p>A. Lower hook must be on same side of liftwheel as upper hook</p> <p>B. Readjust brake (See pages 9 and 10t).</p> <p>C. See Item 4A.</p> <p>D. Replace brake parts which are worn.</p> <p>E. See Item 2A.</p>

# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST EXPLODED VIEW 1/4, 1/2, 1, 1½ & 2 TON



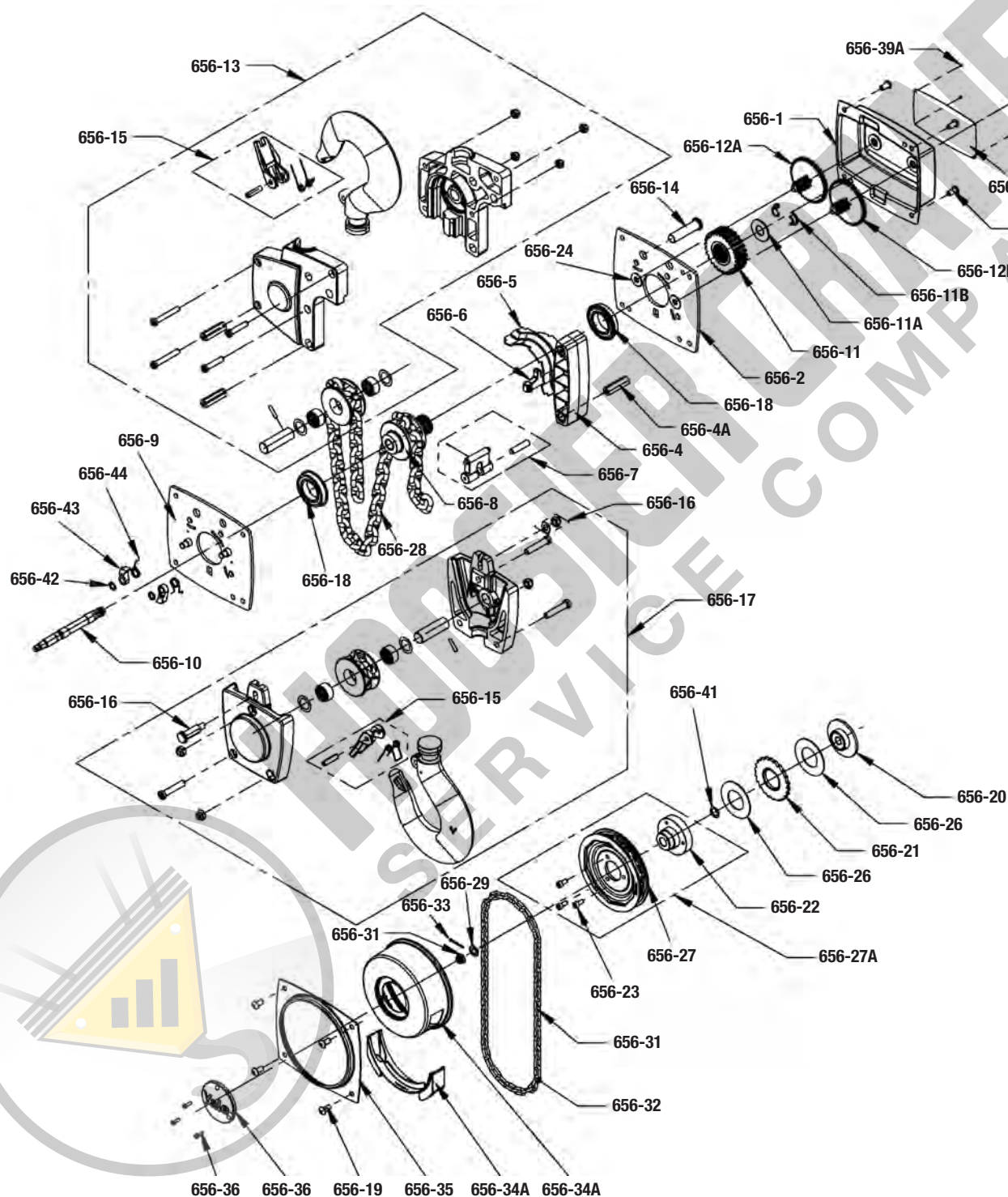
**SEE PARTS LIST  
ON PAGE 21**

# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST EXPLODED VIEW 3 & 4 TON



**SEE PARTS LIST  
ON PAGE 21**

# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST EXPLODED VIEW 5 & 6 TON



**SEE PARTS LIST  
ON PAGE 21**



# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST

## REPAIR PARTS LIST

### 1/4 THROUGH 6 TON

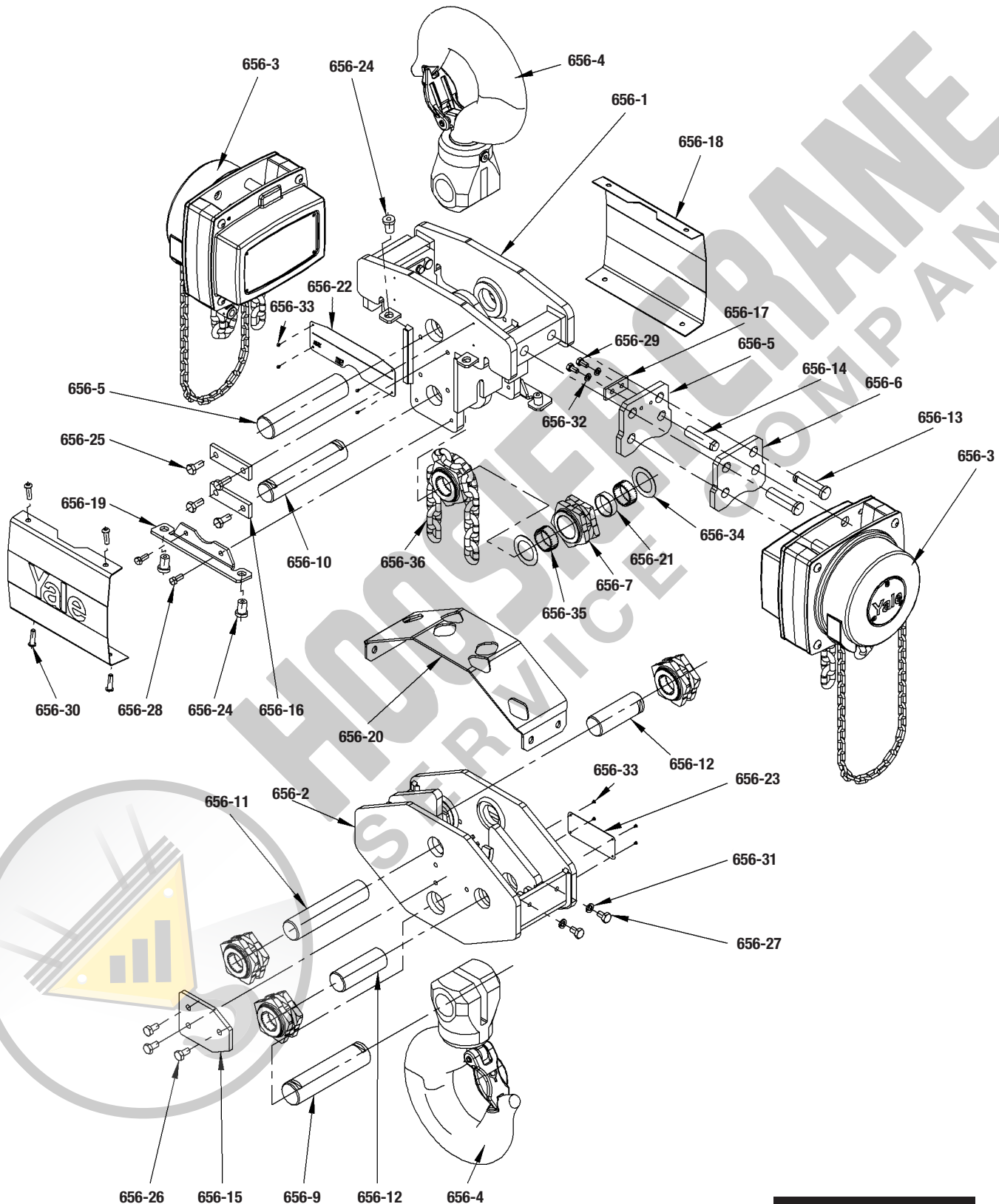
**ORDERING INSTRUCTIONS:** The following information must accompany all correspondence and orders for replacement parts.

1. Hoist rated load from nameplate.
2. Serial number of the hoist stamped on nameplate.
3. Length of lift.
4. Key number of part from parts list.

Drawing Reference Number	Description	Part Number				Qty.
		1/4, 1/2 & 1 ton	1 1/2 & 2 ton	3 & 4 ton	5 & 6 ton	
656-1	Gear cover assembly	N00402020	N00402060	N00402060	N00402060	1
656-9	Side plate, assembly with bearing (left)	N00402189	N00402204	N00402214	N00402204	1
656-2	Side plate assembly with bearing (right)	N00402188	N00402205	N00402213	N00402205	1
656-17	Bottom block assembly (copper plated)	N00402039	N00402079	N00402101	N00402158	1
656-8	Load sheave assembly	N00402186	N00402202	N00402202	N00402202	1
656-4	End cover assembly	N00400267	N00400472	N00400472	N00400472	2
656-4A	Distance bolt	N00400269	N00400471	N00400471	N00400471	4
656-5	Chain guide	N00402022	N00402062	N00402062	N00402062	1
656-6	Stripper	N00402023	N00402063	N00402063	N00402063	1
656-7	Chain end stop assembly	N00402024	N00402064	N00402146	N00402064	1
656-10	Drive pinion	N00401230	N00401260	N00401260	N00401260	1
656-11	Gear Z4	N00401296	N00400456	N00400456	N00400456	1
656-11A	Washer	N00401243	N00401255	N00401255	N00401255	1
656-11B	Locating ring	N00401242	N00401261	N00401261	N00401261	2
656-12A	Gear assembly (Gear "A")	N00400260	N00400476	N00400476	N00400476	1
656-12B	Gear assembly (Gear "B")	N00400259	N00400475	N00400475	N00400475	1
656-13	Upper hook assembly (copper plated)	N00402038	N00402078	N00402100	N00402157	1
656-14	Suspension bolt	N00402028	N00402068	N00402139	N00402068	1
656-15	Safety latch kit (copper plated)	N00402286	N00402288	N00402289	N00402288	2
656-16	Chain bolt with nut (copper plated)	N00402291	N00402293	—	N00402293	1
656-18	Bearing	N09151118	N09151121	N09151121	N09151121	2
656-19	Screw	N09102264	N09108020	N09108020	N09108020	8
656-20	Disc hub	N00401223	N00401267	N00401267	N00401267	1
656-21	Ratchet disc assembly	N00401311	N00401313	N00401313	N00401313	1
656-22	Hub	N00401682	N00401684	N00401684	N00401684	1
656-23	Screw	N00402215	N00402216	N00402216	N00402216	3
656-24	Roller set	—	—	N00400756	N00400756	1
656-26	Friction disc	N00401534	N00404732	N00404732	N00404732	2
656-27	Hand chain wheel	N00402191	N00402207	N00402207	N00402207	1
656-27A	Hand chain wheel assembly	N00402190	N00402206	N00402206	N00402206	1
656-28	Load chain (stainless steel)	N04307636	N04307648	N04307648	N04307648	1*
656-29	Washer	N09121006	N09121010	N09121010	N09121010	1
656-30	Castle nut	N09117058	N09117057	N09117057	N09117057	1
656-31	Hand chain (stainless steel)	N04307655	N04307655	N04307655	N04307655	1*
656-32	Connecting link	N00400668	N00400668	N00400668	N00400668	1
656-33	Cotter pin	N09125069	N09125042	N09125042	N09125042	1
656-34A	Hand chain wheel cover assembly	N00402192	N00402208	N00402208	N00402208	1
656-35	Supporting plate	N00402036	N00402076	N00402076	N00402076	1
656-36	Cap	N00401320	N00401338	N00401338	N00401338	1
656-38	Warning label kit (3 labels)	C56815	C56825	C56825	C56825	---
656-39	Name plate ATEX with classification II 2 GD c IIC T4	192021868 (1/4 ton)	192021872 (1 1/2 ton)	192021874 (3 ton)	192021876 (5 ton)	1
		192021870 (1/2 ton)	192021873 (2 ton)	192021875 (4 ton)	192021877 (6 ton)	1
		192021871 (1 ton)	—	—	—	1
656-39A	Round head grooved pin	N09128008	N09128008	N09128008	N00401261	4
656-41	Retaining ring	N09129008	N09129024	N09129038	N09129038	1
656-42	Retaining ring	N09129031	N09129038	N09129038	N09129038	2
656-43	Pawl	N00401224	N00401252	N00401252	N00401252	2
656-44	Spring	N00401226	N00401264	N00401264	N00401264	2
N/S	Hand chain guide	N00400263	N00400468	N00400468	N00400468	1
N/S	Screw	N09102219	N09102199	N09102199	—	3
N/S	Roller set	—	—	N00400756	N00400756	1

\* Specify length (available by the foot)

# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST EXPLODED VIEW 8, 10 & 12 TON



**SEE PARTS LIST  
ON PAGE 23**

# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST

## REPAIR PARTS LIST

### 8, 10 & 12 TON

**ORDERING INSTRUCTIONS:** The following information must accompany all correspondence and orders for replacement parts.

1. Hoist rated load from nameplate.
2. Serial number of the hoist stamped on nameplate.
3. Length of lift.
4. Key number of part from parts list.

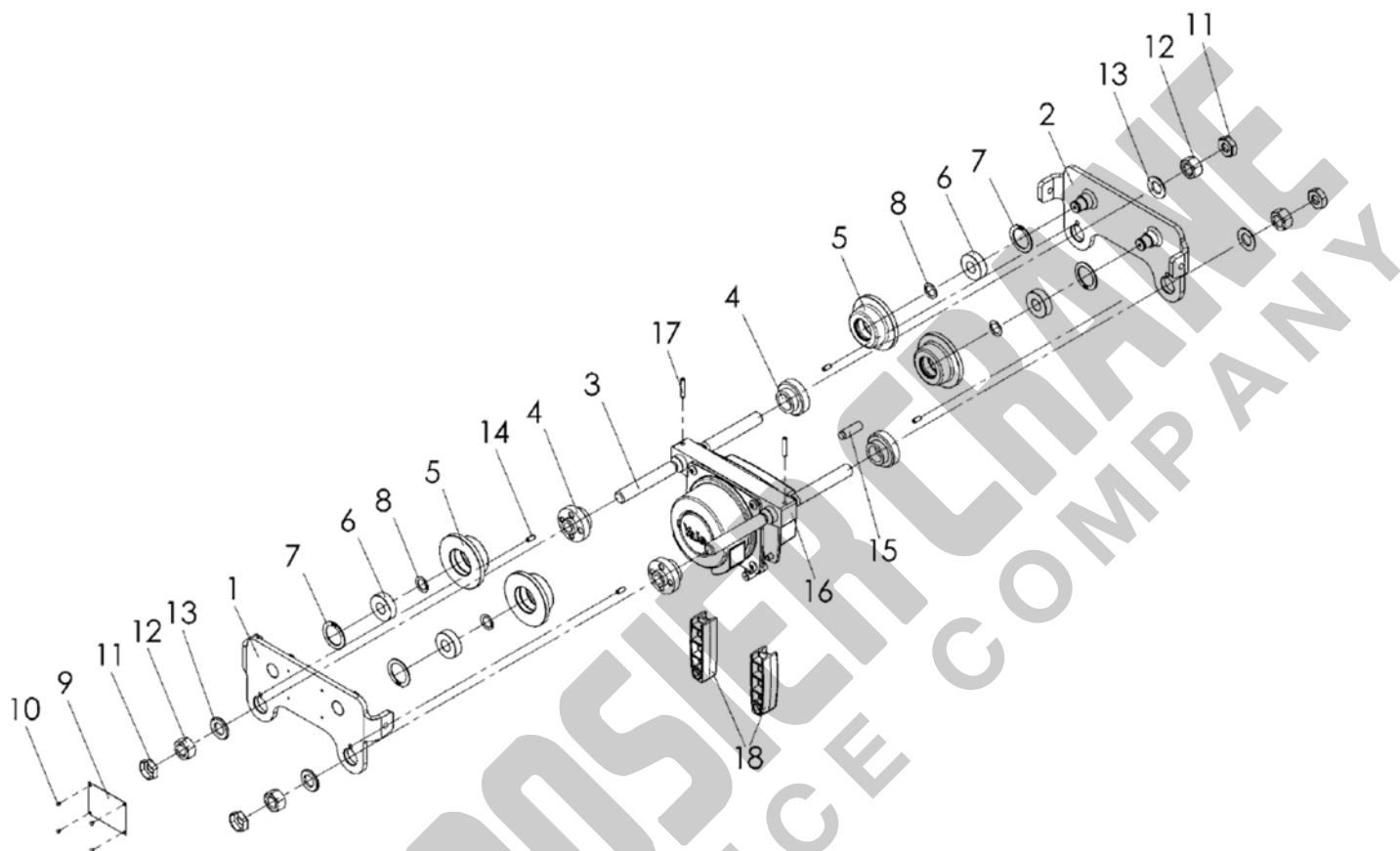
Drawing Reference Number	Description		Qty.
		8, 10 & 12 ton	
656-1	Supporting frame assembly	N00402161	1
656-2	Bottom block	N00402162	1
656-3	YL ATEX 3000 VG	N04705017	2
656-4	Hook assembly (copper plated)	N00402160	2
656-5	Adapter plate	N00402164	2
656-6	Adapter plate	N00402165	2
656-7	Pulley	N00402166	5
656-8	Top hook bolt	N00400915	1
656-9	Load hook bolt	N00400917	1
656-10	Top pulley bolt	N00400916	1
656-11	Bottom pulley bolt	N00400918	1
656-12	Bottom pulley bolt	N00401098	2
656-13	Suspension bolt	N00402167	4
656-14	Supporting bolt	N00550147	2
656-15	Axle support	N00402169	2
656-16	Axle support	N00402170	4
656-17	Axle support	N00402171	2
656-18	Side cover	N00402172	2
656-19	Side cover support	N00402173	2
656-20	Cover plate for bottom block	N00402174	1
656-21	Distance ring	N00402175	5
656-22	Name plate ATEX with classification II 2 GD c IIC T4	192021878 (8 ton)	1
		192021879 (10 ton)	1
		192021881 (12 ton)	1
		192022303 (8 ton)	1
656-23	Capacity plate	192022304 (10 ton)	1
		192022306 (12 ton)	1
656-24	Nut	N09177096	8
656-25	Screw	N09101023	8
656-26	Screw	N09101016	6
656-27	Screw	N09101418	4
656-28	Screw	N09101013	4
656-29	Screw	N09101415	4
656-30	Round head screw	N09108052	8
656-31	Spring washer	N09122013	4
656-32	Spring washer	N09122016	4
656-33	Round head grooved pin	N09128004	8
656-34	Washer disk	N09153054	10
656-35	Needle roller	N09153113	10
656-36	Load chain (stainless steel)	N04307648	1*
656-37	Warning label kit (3 labels)	—	—

\* Specify length (available by the foot)

# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST

## REPAIR PARTS LIST

**1/4 THROUGH 2 TON WITH INTEGRATED PLAIN TROLLEY**



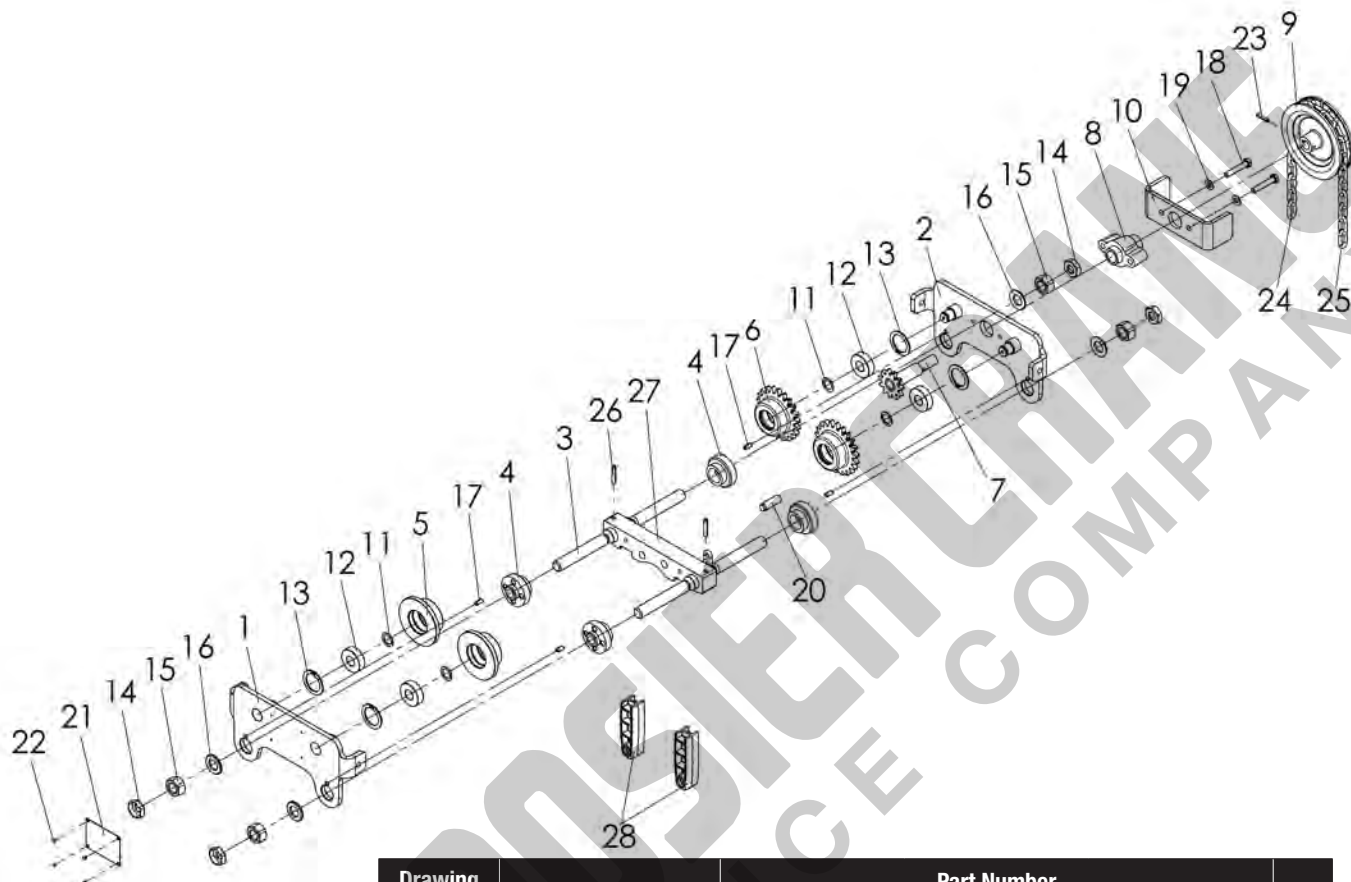
Drawing Reference Number	Description	Part Number		Qty.
		1/4, 1/2 & 1 ton	1 1/2 & 2 ton	
1	Side plate (left)	00552036	00552038	1
2	Side plate (right)	00552041	00552043	1
3	Clevis load bar A	00552002	00559158	2
3	Clevis load bar B	00552003	00559159	2
4	Nut	00552051	00552053	4
5	Roller, without geared	00500005	00500007	4
6	Bearing	09151074	09151046	4
7	Retaining ring	09130024	09130046	4
8	Retaining ring	09129029	09129002	4
9	Name plate	192022393	192022393	1
10	Round head grooved pin	09128004	09128004	4
11	Nut	09115152	09115154	4
12	Nut	09115089	09115090	4
13	Washer	09121021	09121016	4
14	Spring pin	09134055	09134054	4
15	Bolt	00552110	00550147	1
16	Middle bar	00550126	00550142	1
17	Spring pin	09134074	09134003	2
18	End cover	00400724	00400733	2
*	Buffer	00440001	00440001	4
*	Nut	09115098	09115098	4



# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST

## REPAIR PARTS LIST

**1/4 THROUGH 4 TON WITH INTEGRATED GEARED TROLLEY**



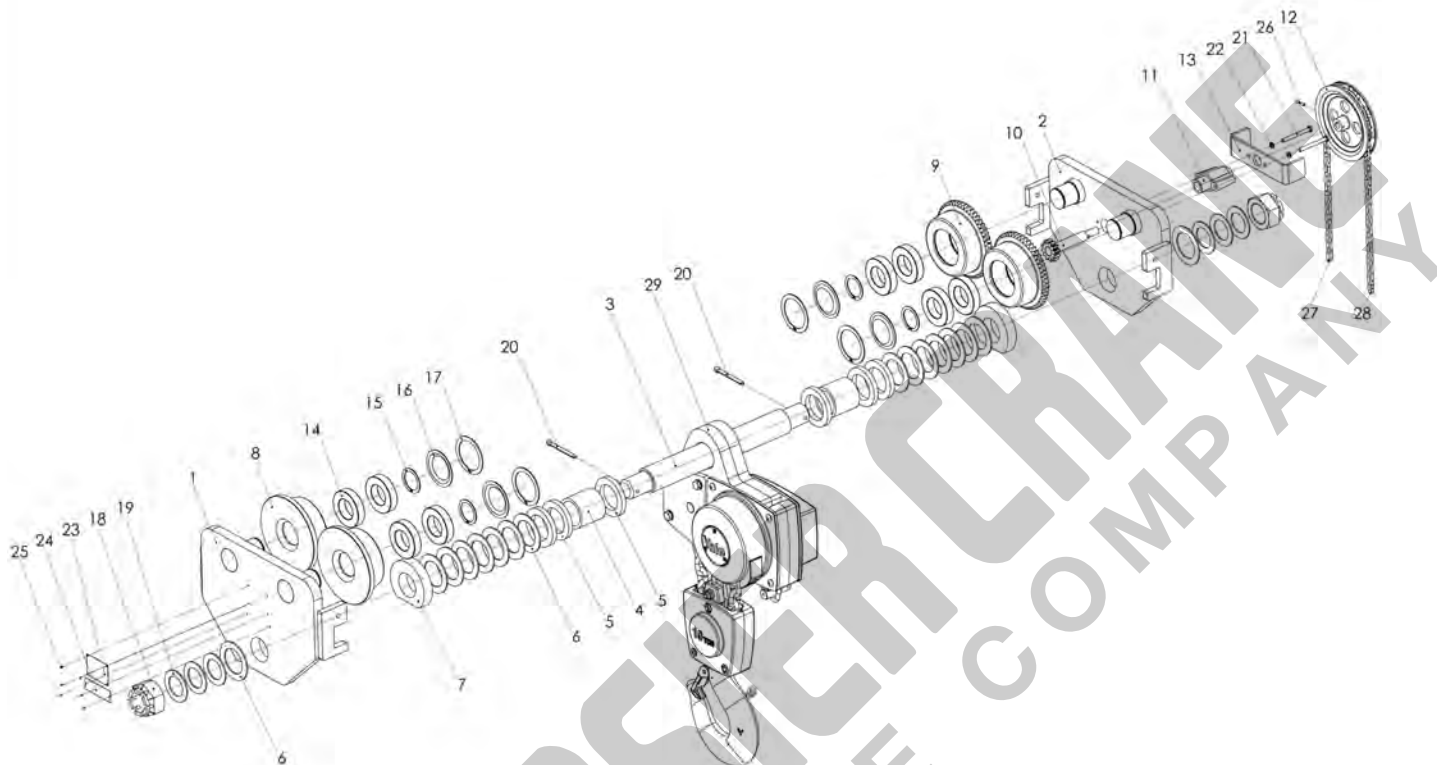
Drawing Reference Number	Description	Part Number			Qty.
		1/4, 1/2 & 1 ton	1 1/2 & 2 ton	3 & 4 ton	
1	Side plate (left)	00552036	00552038	00552039	1
2	Side plate (right)	00552046	00552048	00552049	1
3	Clevis load bar A	00552002	00552006	00552008	2
3	Clevis load bar B	00552003	00552007	00552009	2
4	Nut	00552051	00552053	00552054	4
5	Roller, without geared	00500005	00500007	00500008	2
6	Plain roller geared	00500010	00500012	00500013	2
7	Driving pinion, assy.	00557206	00557206	00557206	1
8	Clevis foot	00552083	00552085	00552086	1
9	Hand chain wheel	00552087	00552089	00552088	1
10	Hand chain guide	00552090	00552091	00552092	1
11	Retaining ring	09129029	09129002	09129003	4
12	Bearing	09151074	09151046	09151079	4
13	Retaining ring	09130024	09130046	09130060	4
14	Nut	09115152	09115154	09115155	4
15	Nut	09115089	09115090	09115156	4
16	Washer	09121021	09121016	09121213	4
17	Spring pin	09134055	09134054	09134120	4
18	Screw	09101052	09101050	09101050	2
19	Washer	09121001	09121010	09121010	2
20	Bolt	00552110	00552112	00552112	1
21	Name plate	192022393	192022393	192022393	1
22	Round head grooved pin	09128004	09128004	09128004	4
23	Spring pin	09134052	09134052	09134052	1
24	Hand chain	04307655	04307655	04307655	1*
25	Connecting link	00400668	00400668	00400668	1
26	Spring pin	09134074	09134084	09134047	2
27	Middle bar	00552065	00552067	00552068	1
28	End cover	00400724	00400733	00400733	2
---	Buffer	00440001	00440001	00440002	4
---	Nut	09115098	09115098	09115036	4

\* Specify length (available by the foot)

# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST

## REPAIR PARTS LIST

### 5 & 6 TON WITH INTEGRATED GEARED TROLLEY



Drawing Reference Number	Description	5 & 6 ton	Qty.
1	Side plate (left)	00530074	1
2	Side plate (right)	00530075	1
3	Clevis load bar	00530076	1
4	Distance sleeve	00530010	2
5	Spacer	00530011	6
6	Washer	00530012	16
7	Brace	00530025	2
8	Roller, without geared	00500009	2
9	Plain roller geared	00500014	2
10	Driving pinion, assy.	00530016	1
11	Clevis foot	00530077	1
12	Hand chain wheel	00530078	1
13	Hand chain guide	00530079	1
14	Groove ball bearing	09150020	8
15	Retaining ring	09129010	4
16	Cap	00530008	4
17	Retaining ring	04307654	4
18	Castle nut	00530014	2
19	Washer	00530013	6
20	Cotter pin	09125035	2
21	Screw	09101038	2
22	Lockwasher	09122016	2
23	Name plate	192022393	1
24	Capacity plate	---	1
25	Round head grooved pin	09128004	4
26	Spring pin	09134082	1
27	Hand chain	04307655	1*
28	Connecting link	00400668	1
29	Suspension lug	00401133	1
29	Fitting panel trolley	---	2
30	Distance sleeve	---	2
---	Buffer	00440002	4
---	Nut	09115036	4

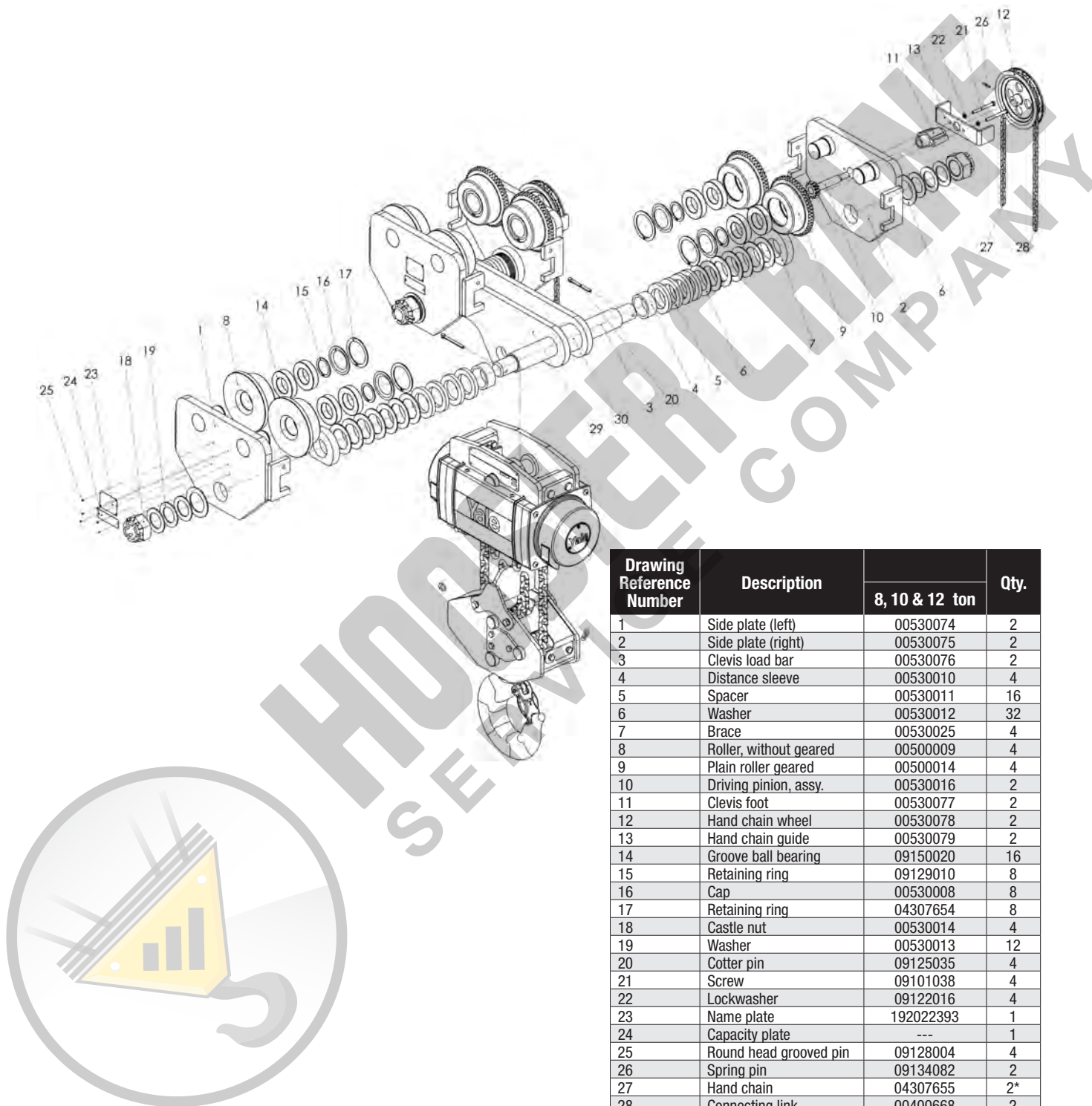
\* Specify length (available by the foot)



# YALE® YALELIFT 360™ ATEX HAND CHAIN HOIST

## REPAIR PARTS LIST

### 8 THROUGH 12 TON WITH INTEGRATED GEARED TROLLEY



Drawing Reference Number	Description	8, 10 & 12 ton	Qty.
1	Side plate (left)	00530074	2
2	Side plate (right)	00530075	2
3	Clevis load bar	00530076	2
4	Distance sleeve	00530010	4
5	Spacer	00530011	16
6	Washer	00530012	32
7	Brace	00530025	4
8	Roller, without geared	00500009	4
9	Plain roller geared	00500014	4
10	Driving pinion, assy.	00530016	2
11	Clevis foot	00530077	2
12	Hand chain wheel	00530078	2
13	Hand chain guide	00530079	2
14	Groove ball bearing	09150020	16
15	Retaining ring	09129010	8
16	Cap	00530008	8
17	Retaining ring	04307654	8
18	Castle nut	00530014	4
19	Washer	00530013	12
20	Cotter pin	09125035	4
21	Screw	09101038	4
22	Lockwasher	09122016	4
23	Name plate	192022393	1
24	Capacity plate	---	1
25	Round head grooved pin	09128004	4
26	Spring pin	09134082	2
27	Hand chain	04307655	2*
28	Connecting link	00400668	2
29	Suspension lug	---	1
29	Fitting panel trolley	00400941	2
30	Distance sleeve	00400942	2
---	Buffer	00440002	4
---	Nut	09115036	4

\* Specify length (available by the foot)

Note: When ordering parts, always furnish rated load and serial number of hoist on which the parts are to be used. For the location of the nearest Columbus McKinnon Master Parts Depot, vcall (800) 888-0985, fax (716) 689-5644 or visit [www.cmworks.com](http://www.cmworks.com).

LIMITATION OF WARRANTIES, REMEDIES AND DAMAGES THE WARRANTY STATED BELOW IS GIVEN IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE. NO PROMISE OR AFFIRMATION OF FACT MADE BY ANY AGENT OR REPRESENTATIVE OF SELLER SHALL CONSTITUTE A WARRANTY BY SELLER OR GIVE RISE TO ANY LIABILITY OR OBLIGATION.

Seller warrants that on the date of delivery to carrier the goods are free from defects in workmanship and materials. SELLER'S SOLE OBLIGATION IN THE EVENT OF BREACH OF WARRANTY OR CONTRACT OR FOR NEGLIGENCE OR OTHERWISE WITH RESPECT TO GOODS SOLD SHALL BE EXCLUSIVELY LIMITED TO REPAIR OR REPLACEMENT, F.O.B. SELLER'S POINT OF SHIPMENT, OF ANY PARTS WHICH SELLER DETERMINES TO HAVE BEEN DEFECTIVE or if Seller determines that such repair or replacement is not feasible, to a refund of the purchase price upon return of the goods to Seller.

Any action against Seller for breach of warranty, negligence or otherwise, must be commenced within one year after such cause of action occurs.

NO CLAIM AGAINST SELLER FOR ANY DEFECT IN THE GOODS SHALL BE VALID OR ENFORCEABLE UNLESS BUYER'S WRITTEN NOTICE THEREOF IS RECEIVED BY SELLER WITHIN ONE YEAR FROM THE DATE OF SHIPMENT.

Seller shall not be liable for any damage, injury or loss arising out of the use of the goods if,

prior to such damage, injury or loss, such goods are (1) damaged or misused following Seller's delivery to carrier; (2) not maintained, inspected, or used in compliance with applicable law and Seller's written instructions and recommendations; or (3) installed, repaired, altered or modified without compliance with such law, instructions or recommendations. UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES AS THOSE TERMS ARE DEFINED IN SECTION 2-715 OF THE UNIFORM COMMERCIAL CODE.

#### INDEMNIFICATION AND SAFE OPERATION

Buyer shall comply with and require its employees to comply with directions set forth in instructions and manuals furnished by Seller and shall use and require its employees to follow such instructions and manuals and to use reasonable care in the use and maintenance of the goods. Buyer shall not remove or permit anyone to remove any warning or instruction signs on the goods. In the event of personal injury or damage to property or business arising from the use of the goods, Buyer shall within 48 hours thereafter give Seller written notice of such injury or damage. Buyer shall cooperate with Seller in investigating any such injury or damage and in the defense of any claims arising therefrom.

If Buyer fails to comply with this section or if any injury or damage is caused, in whole or in part, by Buyer's failure to comply with applicable federal or state safety requirements, Buyer shall indemnify and hold Seller harmless against any claims, loss or expense for injury or damage arising from the use of the goods.



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