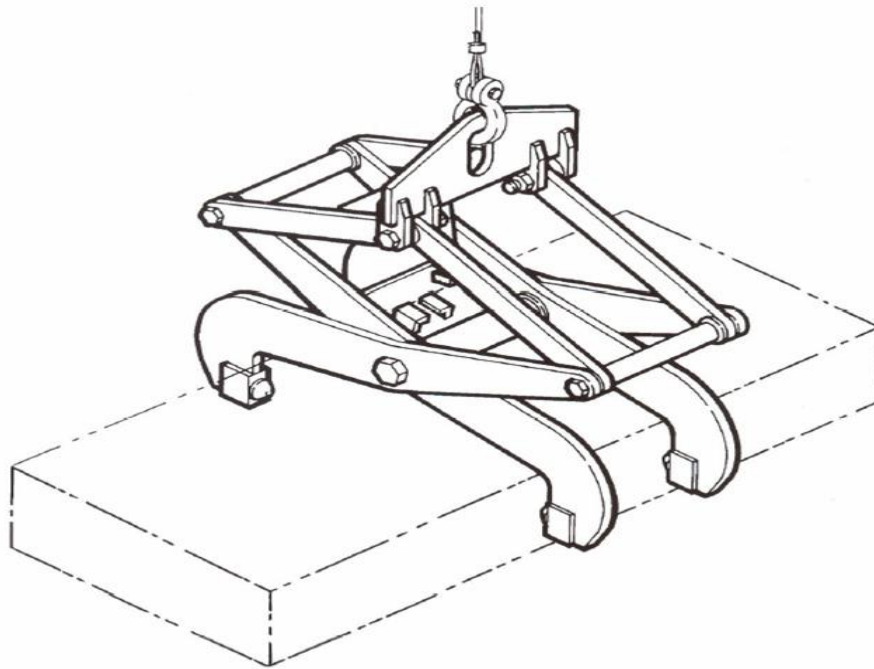


# Operational Guide for Lifting Devices

Prepared by  
The Crane Manufacturers Association  
of America, Inc.



Released September 2006



**CMAA**<sup>SM</sup>  
OEM Crane Component  
Manufacturer

OEM Crane Component Manufacturer  
Crane Manufacturers Association of America

# TABLE OF CONTENTS

DISCLAIMER AND INDEMNITY.....	3
INTRODUCTION.....	5
MARKINGS.....	6
INSTALLATION.....	7
INSPECTION.....	8
INITIAL INSPECTION	
IN SERVICE INSPECTION – FREQUENT	
IN SERVICE INSPECTION - PERIODIC	
MAINTENANCE AND REPAIRS.....	9
OPERATION.....	9
OPERATOR TRAINING	
OPERATING PRACTICES	
HANDLING THE LOAD	
MISCELLANEOUS OPERATING PRACTICES	
DEFINITIONS OF TERMS.....	12
GENERAL INFORMATION / BEFORE LIFTING.....	13
MOVING A LOAD.....	14

# DISCLAIMERS AND INDEMNITY

## CRANE MANUFACTURER'S ASSOCIATION OF AMERICA, INC. (CMAA)

The Crane Manufacturer's Association of America, Inc. (CMAA) is an independent incorporated trade association affiliated with The Material Handling Industry of America Division of Material Handling Industry (MHI).

## MATERIAL HANDLING INDUSTRY AND ITS MATERIAL HANDLING INDUSTRY OF AMERICA DIVISION (MHI)

MHI provides CMAA with certain services and specifically in connection with this Operational Guide, arranges for its production and distribution. Neither MHI, its officers, directors or employees have any other participation in the development and preparation of the information contained in the Guide.

All inquiries concerning this Operational Guide should be directed in writing to the Chairman of the CMAA Engineering Committee, c/o Crane Manufacturer's Association of America, Inc., 8720 Red Oak Blvd., Suite 201, Charlotte, NC 28217.

For a response to technical questions use the CMAA web site  
[www.mhia.org/psc/PSC\\_Products\\_Cranes\\_TechQuestions.cfm](http://www.mhia.org/psc/PSC_Products_Cranes_TechQuestions.cfm) or  
Write directly to the CMAA Engineering Committee at the above address.

## OPERATIONAL GUIDE

Users of this Operational Guide must rely on their own engineers/designers or a manufacturer representative to specify or design applications or uses. This Guide is offered as information and guidance which a user may or may not choose to adopt, modify or reject. If a user refers to, or otherwise employs, all or any part of the Operational Guide, the user is agreeing to the following terms of indemnity, warranty disclaimer, and disclaimer of liability.

The use of Operational Guide is permissive and advisory only and not mandatory. Voluntary use is within the control and discretion of the user and is not intended to, and does not in any way, limit the ingenuity, responsibility or prerogative of individual manufacturers to design or produce electric lifting devices that which do not comply with this Operational Guide. CMAA has no legal authority to require or enforce compliance with this Operational Guide. This Guide provides general procedures for installation, inspection, maintenance and repairs, operation and operator training for lifting devices. Following this Guide does not assure compliance with applicable federal, state, and local laws or regulations and codes. This Operational Guide is not binding on any person and do not have the effect of law.

CMAA and MHI do not approve, rate, or endorse this Guide. They do not take any position regarding any patent rights or copyrights which could be asserted with regard to this Guide and do not undertake to ensure anyone using this Guide against liability for infringement of any applicable Letters Patent, copyright liability, nor assume any such liability. Users of this Guide are expressly advised that determination of the validity of any such copyrights, patent rights, and the risk of infringement of such rights is entirely their own responsibility.

## DISCLAIMERS AND INDEMNITY

**DISCLAIMER OF WARRANTY: CMAA AND MHI MAKE NO WARRANTIES WHATSOEVER IN CONNECTION WITH THIS OPERATIONAL GUIDE. CMAA AND MHI SPECIFICALLY DISCLAIM ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE. NO WARRANTIES (EXPRESS, IMPLIED, OR STATUTORY) ARE MADE IN CONNECTION WITH THIS OPERATIONAL GUIDE.**

**DISCLAIMER OF LIABILITY:** BY REFERRING TO OR OTHERWISE EMPLOYING THIS OPERATIONAL GUIDE, USERS SPECIFICALLY UNDERSTAND AND AGREE THAT CMAA, MHI, THEIR OFFICERS, AGENTS AND EMPLOYEES SHALL NOT BE LIABLE IN TORT AND IN CONTRACT – WHETHER BASED ON WARRANTY, NEGLIGENCE, STRICT LIABILITY, OR ANY OTHER THEORY OF LIABILITY – FOR ANY ACTION OR FAILURE TO ACT IN RESPECT TO THE DESIGN, ERECTION, INSTALLATION, MANUFACTURE, PREPARATION FOR SALE, SALE, CHARACTERISTICS, FEATURES, OR DELIVERY OF ANYTHING COVERED BY THIS GUIDE. BY REFERRING TO, OR OTHERWISE EMPLOYING, THIS GUIDE, IT IS THE USER’S INTENT AND UNDERSTANDING TO ABSOLVE AND PROTECT CMAA, MHI, THEIR SUCCESSORS, ASSIGNS, OFFICERS, AGENTS, AND EMPLOYEES FROM ANY AND ALL TORT, CONTRACT, OR OTHER LIABILITY.

**INDEMNITY:** BY REFERRING TO, OR OTHERWISE EMPLOYING, THIS OPERATIONAL GUIDE, THE USER AGREES TO DEFEND, PROTECT, INDEMNIFY, AND HOLD CMAA, MHI, THEIR SUCCESSORS, ASSIGNS, OFFICERS, AGENTS, AND EMPLOYEES HARMLESS FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, DAMAGES AND LIABILITIES, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING FROM ACCEPTANCE OR USE OF THIS GUIDE INCLUDING LOSS OF PROFITS AND REASONABLE ATTORNEY’S FEES, WHICH MAY ARISE OUT OF THE ACCEPTANCE OR USE OR ALLEGED USE OF THIS GUIDE, IT BEING THE INTENT OF THIS PROVISION AND OF THE USER TO ABSOLVE AND PROTECT CMAA, MHI, THEIR SUCCESSORS, ASSIGNS, OFFICERS, AGENTS, AND EMPLOYEES FROM ANY AND ALL LOSS RELATING IN ANY WAY TO THIS OPERATIONAL GUIDE INCLUDING THOSE RESULTING FROM THEIR OWN NEGLIGENCE.

## SAFTEY ALERT SYMBOL



The Safety Alert Symbol is used in these Guidelines to indicate hazards and to alert the reader to information which should be known, understood, and followed in order to avoid DEATH OR SERIOUS INJURY AND/OR PROPERTY DAMAGE.

- DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
- WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION:** Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.
- IMPORTANT:** Indicates procedures essential for safe operation.

### Warning

Failure to read and comply with any one of the limitations noted in these Guidelines and the manual furnished by the manufacturer of the lifting device could result in serious bodily injury or death, and/or property damage.

## INTRODUCTION

The following Guidelines are presented to you by the Crane Manufacturers Association of America. They are intended to provide you with general procedures for installation, inspection, maintenance and repairs, operation and operator training for lifting devices.

Lifting devices, sometimes called below-the hook lifters, attach hoists to their loads. In addition they may attach, hold, protect, control and orient the load in the material flow process. They are independent of the crane, hoist, trolley and carrier hook. Samples of included equipment appear below.

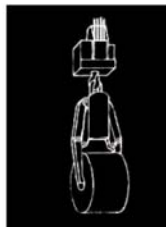
Most lifters can be categorized as either supporting (\*3), indentation type pressure gripping (\*4), or friction type pressure gripping (\*5) lifters. However, many lifters within these categories have been designed for the particular requirements imposed by specialized lifting tasks.



Pallet Lifter



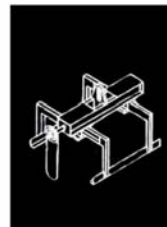
Telescoping Coil Grab



Parallelogram Coil Grab



"C" Hook



Telescoping Sheet Lifter



Lock Bar Sheet Lifter



Slab Tong



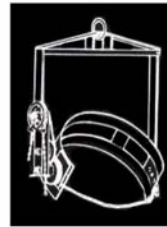
Lifting Beam



Clamping Tong



Vertical Axis Coil Grab



Drum Turner



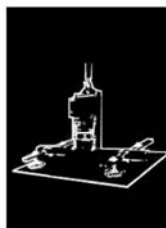
Coil Positioning Hook



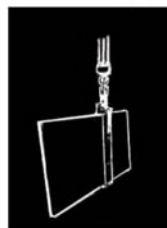
Ingot Turnover Grab



Two Pad Mechanical Vacuum Lifter



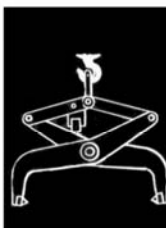
Four Pad Powered Vacuum Lifter Manipulator



Verti-Plate Lifter



Four Drum Handler



Hoist Operated Slab Tong

**The procedures set forth in these Guidelines are not substitutes for the manufacturer's operations manual nor for the operator's exercise of care and judgment.**

The potential hazards involved in using lifting devices cannot be overcome solely by mechanical means. The operator must be alert, competent, and trained in the safe operation of lifters. It is also essential for the operator to exercise intelligence, care and common sense in anticipating the motions that may occur as the load is lifted.

Because of the great variety of lifting devices, each of these Guidelines may not be applicable to every lifter, nor are they proposed as a substitute for the manufacturer's operation manual. They are offered as a general guide to assist in the pursuit of the efficient operation of lifting devices.

An essential part of every safety program must be reading and understanding the manufacturer's operating instructions. Any questions or issues that are confusing must be clarified with the manufacturer before putting the lifter into service.

## **DANGER**

Design modifications for lifters should not be performed without the full understanding and approval of the manufacturer. Design modifications, performed without the manufacturer's approval, could result in serious bodily injury or death and/or property damage. They may also invalidate the manufacturer's warranty.

If you have additional questions or would like more information about lifting devices, contact:

Crane Manufacturers Association of America  
8720 Red Oak Blvd., Suite 201  
Charlotte, NC 28217-3992

Phone: 704-676-1190  
Fax: 704-676-1199  
E-mail: [cmaa@mhia.org](mailto:cmaa@mhia.org)

## **MARKINGS**

The nameplate attached to the lifter should include:

- Manufacturer's name and address
- Serial number
- Lifter weight
- Rated load capacity (\*6)

In addition to its location on the nameplate, the rated load capacity (\*6) should be easily visible on each side of the lifter frame. If the lifting device is made up of several lifters, each detachable from the whole, each should be marked with its individual rated load capacity.

Electric motors should have nameplates that include the information required by the National Electric Manufacturers Association (NEMA).

## **IMPORTANT**

A tag or decal attached to each lifter should include at least the following instructions:

- Do not operate without having read operating instructions.
- Do not operate unit until it is inspected before each shift.
- Do not lift people or carry loads over people.
- Do not lift more than rated load capacity.
- Do not operate a malfunctioning unit or one with an “out of order” tag. Follow lock out/tag out procedures per ANSI Standard Z244.1.
- Do not use lifter for other than designated purposes.
- Do not lift load higher than necessary or leave it suspended unattended.
- Do not use a lifter when capacity, weight or safety markings are missing.
- Do not make alterations or modifications to lifter.
- Do not lift a load that is not balanced for tilting.
- Do not remove or obscure this warning label.

Warning labels and additional decals of various types must be affixed to each lifter. Many lifters carry pinch point warnings that direct the operator to use extreme caution to protect hands and fingers from injury. Operators must use handles when supplied.

All warning labels and decals must be maintained so that they remain clean and legible. Replace as necessary.

## INSTALLATION

Lifting devices are to be assembled and installed in accordance with the manufacturer’s instructions.

### **DANGER**

When a lifter requires an auxiliary power supply for operation, a designated person (\*9) must ensure that the power source matches the requirements of the lifter. The power supply must be connected to the line side of the crane disconnect switch or to an independent circuit as specified in the manufacturer’s operating instructions. Power must be disconnected at the source before making electrical connections.

Follow all the manufacturer’s installation instructions pertaining to electrical connections, lubrication and fluid requirements.

# INSPECTION

## **Warning**

Operating practices for lifting devices must require initial inspection before operation and regularly scheduled inspection procedures thereafter.

### **Initial Inspection**

Before use, all lifters must be inspected by a designated person (\*9) in accordance with the manufacturer's instructions. If no instructions have been furnished, contact the manufacturer to obtain them.

### **In Service Inspection – Frequent**

The lifter must be visually inspected by or under the direction of a designated person (\*9) on a daily, weekly or other basis depending on the type of lifter, the severity of service and other factors that may be described in the manufacturer's instructions. Deficiencies to look for include, but are not limited to:

- Structural deformation.
- Cracks or distortion in the structural frame, cracks in welds, hoist-hook attachment points, mechanically operating parts, attached slings, clevises or hooks.
- Malfunctions during the operation of a lifter.
- Compliance with any supplemental instructions issued by the manufacturer.
- Loose or missing guards, covers, fasteners or stops.
- Faulty operation of automatic hold and release mechanisms.
- Wear of hoist hooking points, load supporting clevises, pins, slings, linkages or mechanical parts.
- Missing nameplates or other markings.

### **In Service Inspection – Periodic**

The lifter must be inspected by an appointed person (\*7) on a monthly to yearly schedule depending on the manufacturer's instructions, the type of lifter and the severity of service. The purpose of these inspections includes determining whether parts have worn beyond the limits specified by the manufacturer.

If any deficiencies are found during an inspection, the lifter must be tagged immediately as "out-of-service". Disconnect power at source before servicing and follow lock out/tag out procedures to avoid danger of electrocution. Refer to ANSI Standard Z244.1. The lifter must remain out-of-service until repairs are completed in compliance with the manufacturer's instructions.

Dated records of all inspection and maintenance procedures should be maintained by an appointed person (\*7) as a permanent record.



## MAINTENANCE AND REPAIRS

### CAUTION

#### Maintenance

A preventative maintenance program, based on the manufacturer's recommendations, should be established for each lifter by a qualified person (\*). Also, as noted in the introduction it is imperative that any supplements to the manufacturer's original instructions be read, understood, and incorporated into the maintenance program.

#### Repairs

Repairs and any required interaction with the manufacturer must be handled by a qualified person (\*8). While some repairs can be performed in the field, all structural repairs and modifications must be performed by or under the direction of the manufacturer.

After being repaired, the lifter must be given an "Initial Inspection," as described above, before being returned to service.

Additionally, all repaired lifters must be operationally tested and load tested before being returned to service to assure compliance with manufacturer's specifications. Refer to ASME B30.20 for load test requirements.

Dated records and details of repairs and parts replacement must be carefully maintained.

## OPERATION

### Warning

The operator of a lifting device must be instructed in its use by a designated person (\*9) in accordance with the manufacturer's recommendations. The operator must also be fully familiar with the following minimal guidelines.

#### Operator Training

Lifters must be operated in accordance with the manufacturer's operating instructions and only by personnel who have been trained according to the principles described in these guidelines. Training should also include instruction regarding the following:

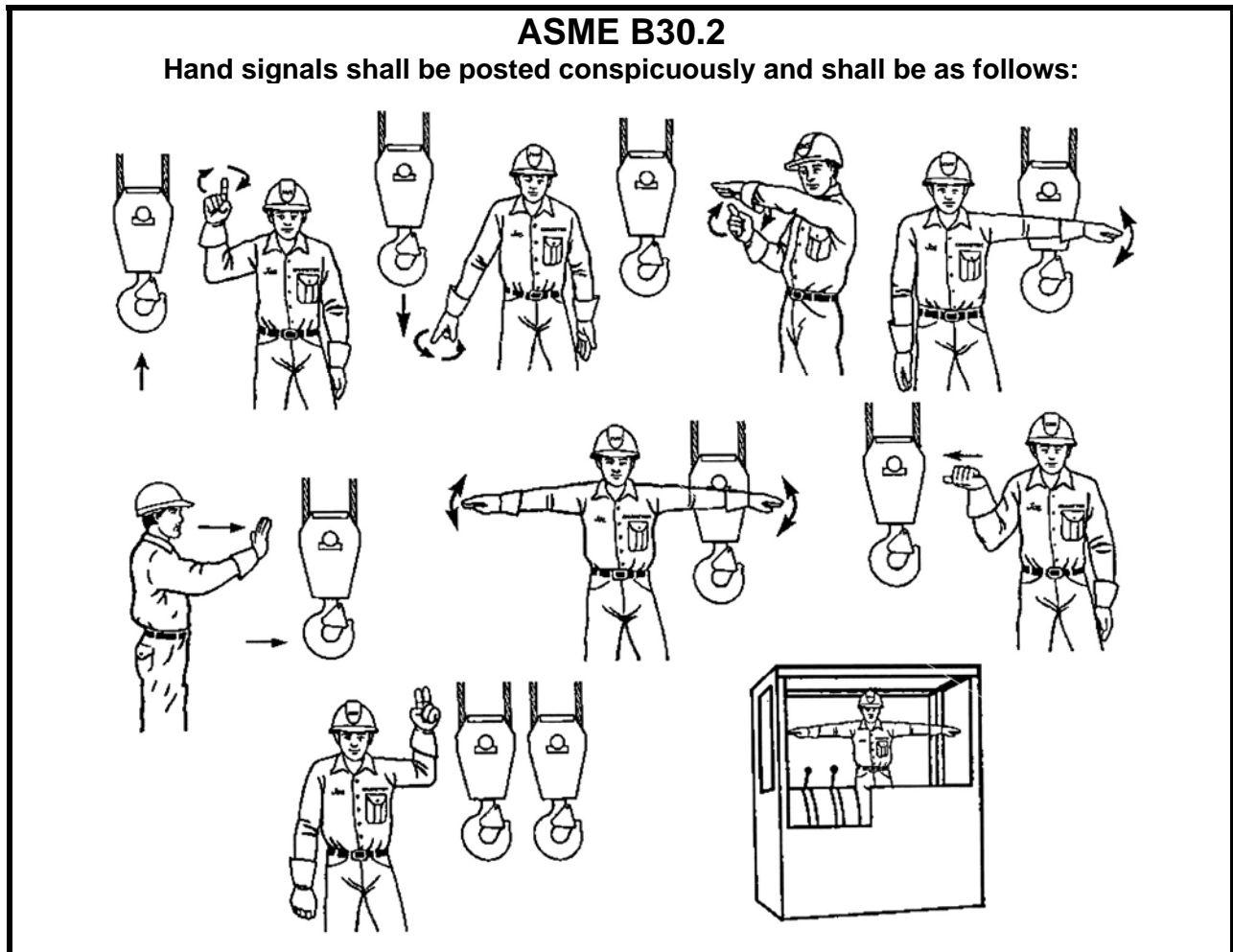
- Details of the lifting cycle.
- Application of the lifter to the load, including the manufacturer's recommended adjustments (if any) for adaptations for various sizes and kinds of loads.
- Instruction in any special operations or precautions that may be required.
- Recognition of proper load configuration.

- Before assuming responsibility for using the lifters, operators should demonstrate for the instructor their understanding of the lifting procedure. The instructor should record notes of each operator's demonstrated ability and retain these notes for personnel records.

### Operating Practices

- The operator or a designated person (\*9) must determine that all loads are secure and that nothing will fall during the lifting cycle.
- The operator must closely monitor the lifter's performance during the lifting procedure. Use of the lifter must be stopped immediately if any improper performance is observed.
- The operator must be familiar with standard hand signals for crane operation. Sources for hand signals include ANSI, CMAA and AISC.
- The operator must respond to signals from the designated person only. However, "stop signals" from anyone must be obeyed.
- If the operator considers a load to be unstable, the load should not be moved until the unstable condition is rectified and a qualified person (\*8) approves that the lifting operation can proceed.

### Standard Hand Signals Operator Should Wear Proper Safety Clothing



## **Warning**

### **Handling the Load**

- The lifter must not be loaded in excess of its rated load capacity (\*6).
- The combined weight of the lifter and load must not exceed the rated load capacity of the crane or the hoist.
- The lifter must be applied to the load in accordance with the manufacturer's recommended operating procedure.
- Lifter ropes, chains and slings must not be kinked. Multiple part lines must not be twisted around each other.
- The lifter must not touch obstructions.
- The lifter operator and all other persons must stay a safe distance from the lifter. Arms and legs should not be allowed to extend under suspended loads.
- Never ride or allow others to ride on a lifter.
- Do not slide the lifter or load across any surface.
- Do not use the lifter for loads for which it is not designed.
- Make a preliminary lift of a few inches to determine that the load is properly balanced.
- Avoid sudden starts and stops. Accelerate and decelerate all loads smoothly.

## **Warning**

### **Miscellaneous Operating Practices**

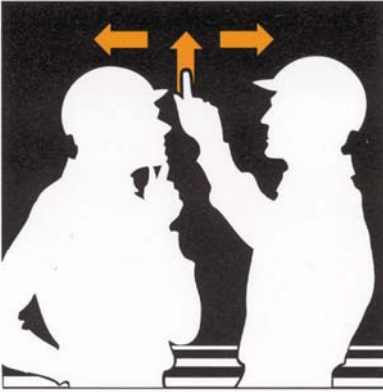
- Only a designated person (\*9) may remove an out-of-service tag from a lifter.
- Do not remove or deface a lifter's nameplates or markings.
- Store lifter properly after use.
- Make sure lifter is stable when stored.

## DEFINITIONS OF TERMS

1. **Structural Lifter** – A lifter which consists of one or more rigid parts for attaching the load to the lifting device.
2. **Mechanical Lifter** – A lifter composed of two or more rigid parts that move with respect to each other to attach the load to the hoisting device.
3. **Supporting Lifter** – A lifter that carries the load on rigid projections or weight bearing surfaces.
4. **Indentation Type Pressure Gripping Lifter** – A lifter that clamps the load and supports it by friction without causing permanent deformation of the load.
5. **Friction Type Pressure Gripping Lifter** – A lifter that clamps the load and supports it by friction without causing permanent deformation of the load.
6. **Rated Load Capacity** – The maximum load for which the equipment is designed by the manufacturer.
7. **Appointed Person** – One who is assigned specific responsibility by the employer or the employer's representative.
8. **Qualified Person** – One who by possession of a recognized degree, certificate or professional standing, or by extensive knowledge, training and experience has successfully demonstrated the ability to solve or resolve problems related to lifting devices.
9. **Designated Person** – A person selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

# GENERAL INFORMATION / BEFORE LIFTING

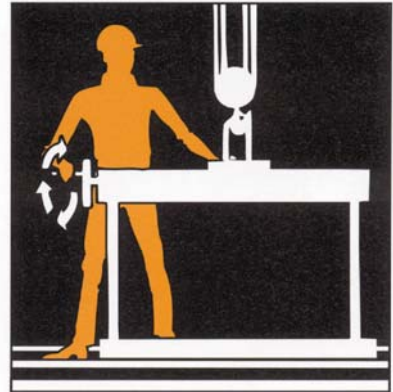
## ⚠ Warning



Lifters must only be used by trained operators.



Do not allow yourself to be distracted. Pay attention to what you are doing.



Test operation of moving lifter parts and controls at the beginning of each shift.



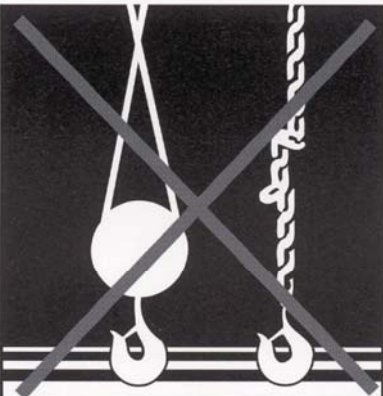
Do not overload crane or hoist. Make sure the combined weight of the lifter and load does not exceed the rated load capacity of the crane or hoist.



To ensure load is balanced and stable, make a preliminary lift of a few inches.



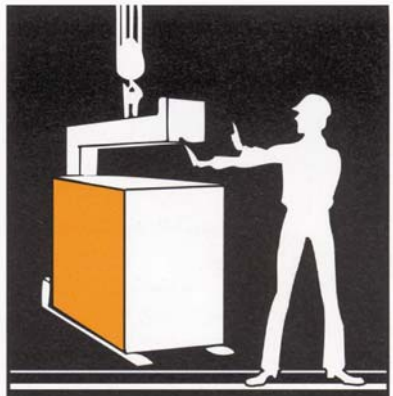
Do not overload lifter. Do not try to lift a load that is too big for the lifter.



Before lifting, make sure hoist rope or chain is free from twists, knots and kinks. Multiple part lines should not be twisted around each other.



Do not pick up hot loads unless the lifter is specially designed for high temperature service.



Refuse to make lift if you are unsure about any issues. Do not proceed until all issues have been resolved.

# MOVING A LOAD

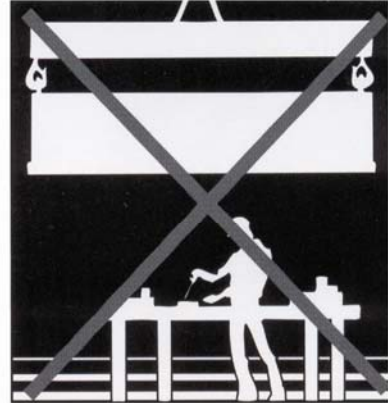
## ⚠ Warning



Take instructions only from the person designated to give signals.



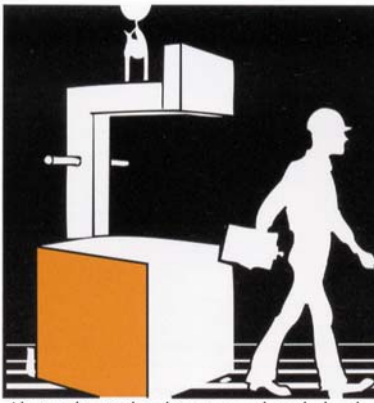
Do not allow loads to come in contact with other objects. Make sure the path of travel is free of obstructions before moving the load.



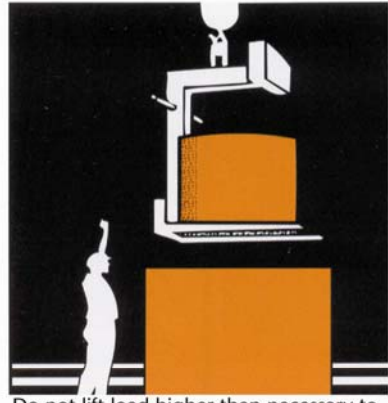
Do not lift loads over people. Stay out from under the load and make sure other people remain at a distance.



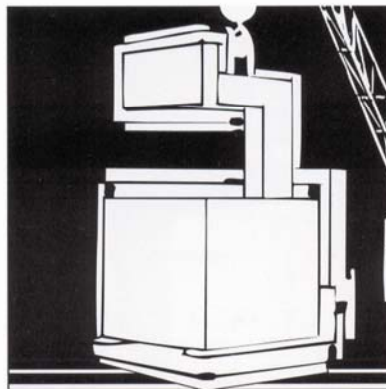
Do not ride on lifter or allow other people to do so.



Always lower load to ground and check its stability before leaving the area.



Do not lift load higher than necessary to avoid obstructions in its path.



Avoid sudden starts and stops. This prevents shock loading which can stress the system beyond its capacity.



Stay clear while moving load. Do not allow load to swing. Use a rod to push load or a tag line to pull the load. Exercise particular caution with sheet lifters. Be sure to keep load level. Tilting the lifter could cause the load to slide off the lifter.



Make sure the lifter is properly stored after use. Lifters are big and heavy and can cause personal injury or property damage if they fall. Some lifters require a specially designed stand. Others may be stored on a level surface.

© 2006



**CMAA**<sup>®</sup>  
CRANE MANUFACTURERS  
ASSOCIATION OF AMERICA, INC.

CMAA is an Affiliate of  
Material Handling Industry  
8720 Red Oak Blvd., Suite 201  
Charlotte, NC 28217-3992  
Telephone: (704) 676-1190  
Fax: (704) 676-1199  
Website: [www.mhia.org/cmaa](http://www.mhia.org/cmaa)