

Materials Handling

- **Back Injuries And Prevention**
 - **Proper Manual Lifting**
 - **Mechanical Lifting**
(come-alongs to cranes)

AR Training

Updated 2012

DMME

Division of Mineral Mining

Handling And Storing Materials Involves Diverse Operations

Such As:

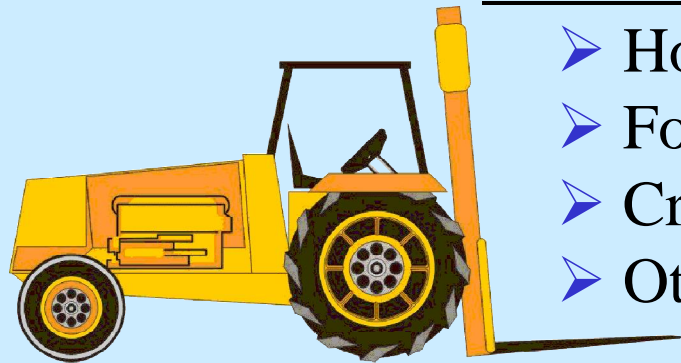
- Manual material handling

- Lifting or carrying bags, containers or materials.
- Unloading and unpacking materials.



- Mechanical material handling

- Hoists
- Forklifts
- Cranes
- Other equipment

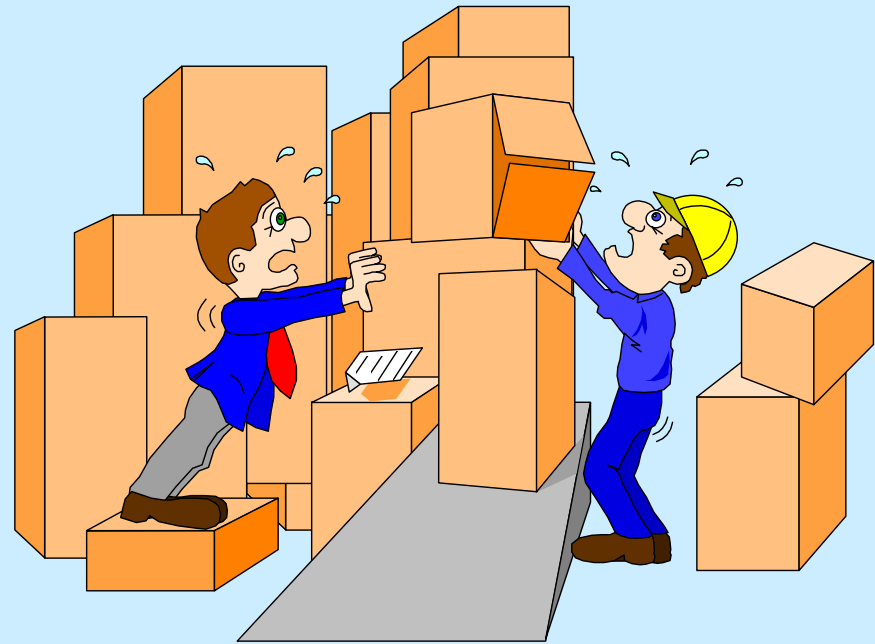


- Stacking or storing

- Hazardous materials

A Few Of The Hazards

- Improper manual lifting or carrying loads that are too large or heavy.
- Being struck by materials including falls of rock or ore.
- Being caught in pinch points.
- Slips, trips & falls caused by uneven, cluttered & slippery surfaces.
- Truck loading & unloading hazards.
- Restricted vision – equipment operators.
- Stuck or frozen objects/parts.
- Poor housekeeping.
- Faulty or improper tools and equipment.
- Poor blocking and/or rigging.



❖ **Workplace and Equipment Examinations are important, and are required!**

Injuries

Persons responsible for materials handling are subject to all types of injuries, including:

- Cuts and bruises.
- Burns or chemical reactions.
- Fractures.
- Back injuries.
- Various types of crushing injuries caused by machines, falling materials or improperly stored materials.



Manual Materials Handling Injuries

- While fatalities are rare, manual materials handling injuries account for about 35% of all mining injuries at surface locations.
- Four out of five of these injuries will affect the lower back.
- Back injuries account for about 25% of the lost-time injuries in the mining industry.
- While the rate of these injuries has declined over recent years, the decline has not been nearly as much as with overall injury rates.



So....

.... Let's Talk About Back Injuries And Prevention

Common Types of Back Injuries:

- Muscle Strain or Spasm
- Ruptured or Herniated Discs



❖ Low back pain can have many other causes

BACK INJURIES CAN TAKE YOU OUT!

Many of these injuries could be avoided if miners practiced a few basic and simple rules for back conservation. The lumbar spine, which includes the five vertebrae and six disks in the curved portion of the lower back, is the part most often injured. Lifting, bending, and twisting motions (on or off the job) can cause severe injury and pain. Because the lumbar region is the area at greatest risk during normal work, it deserves to be the main focus of back conservation and maintenance attention.



Factors Associated With Back Disorders

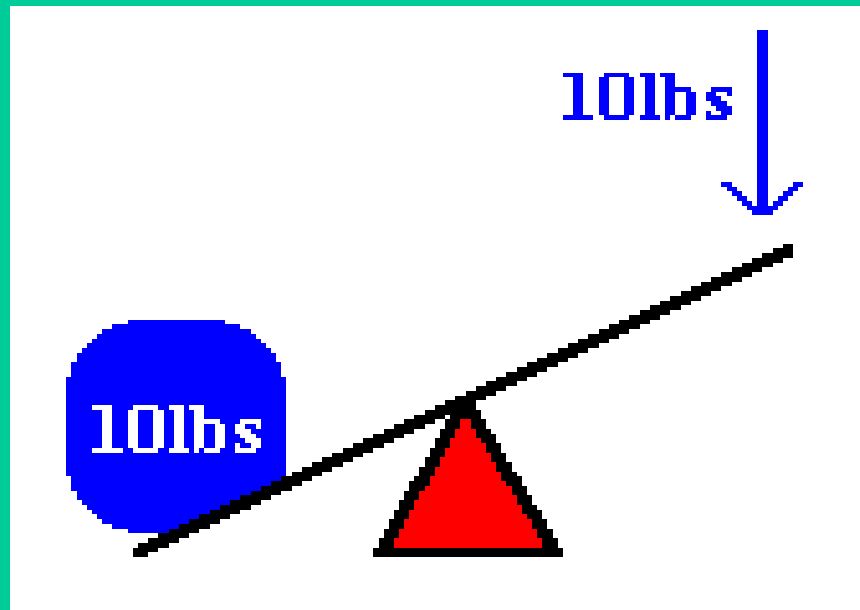
Back disorders result from exceeding the capability of the muscles, tendons, or discs. Or, the cumulative effect of several contributors:

- **Reaching** while lifting
- **Twisting** while lifting
- **Bending** while lifting
- **Poor posture** -- how one sits or stands
- **Staying in one position for too long**
- **Bad body mechanics** -- how one lifts, pushes, pulls, or carries objects
- **Poor physical condition** -- losing the strength and endurance to perform physical tasks without strain
- **Poor design of job or work station**
- **Repetitive lifting of awkward items or equipment**
- **Heavy lifting**
- **Fatigue**



The Forces Involved

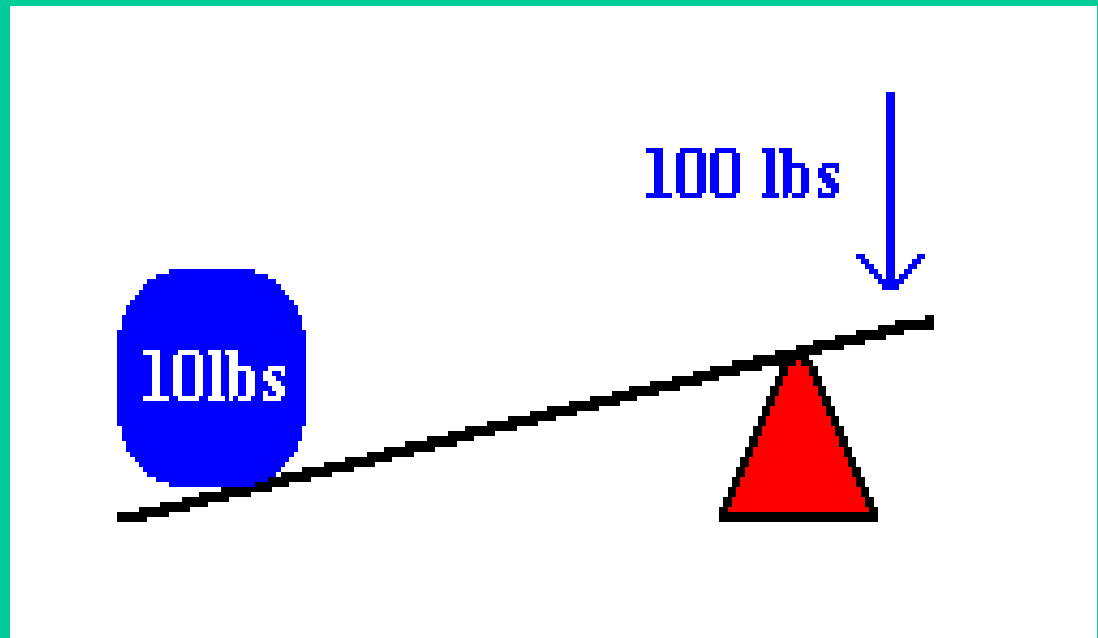
The amount of force you place on your back in lifting may surprise you! Think of your back as a lever. With the fulcrum in the center, it only takes ten pounds of pressure to lift a ten pound object.



The Forces Involved

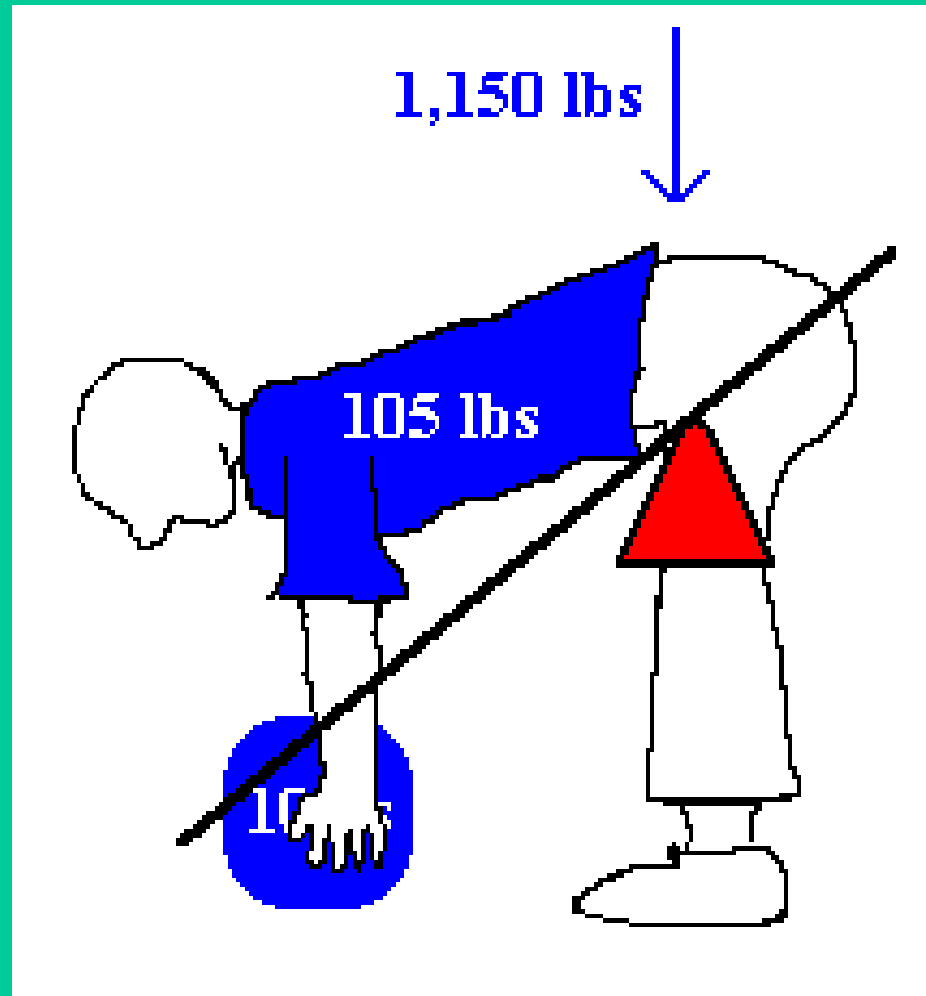
If you shift the fulcrum to one side, it takes much more force to lift the same object. Your waist acts like the fulcrum in a lever system, on a 10:1 ratio.

Lifting a
ten pound
object puts
100 pounds
of pressure
on your
lower back!!



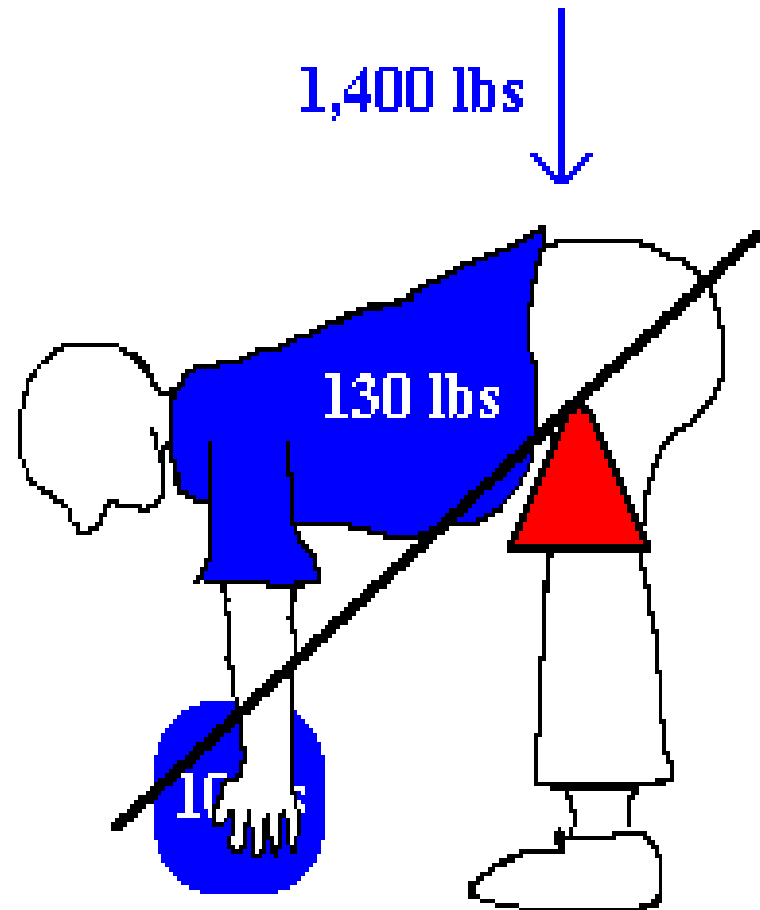
The Forces Involved

When you add in the 105 pounds of the average human upper torso, you see that lifting a ten pound object actually puts 1,150 pounds of pressure on the lower back.



The Forces Involved

If you were 25 pounds overweight, it would add an additional 250 pounds of pressure on your back every time you bend over.



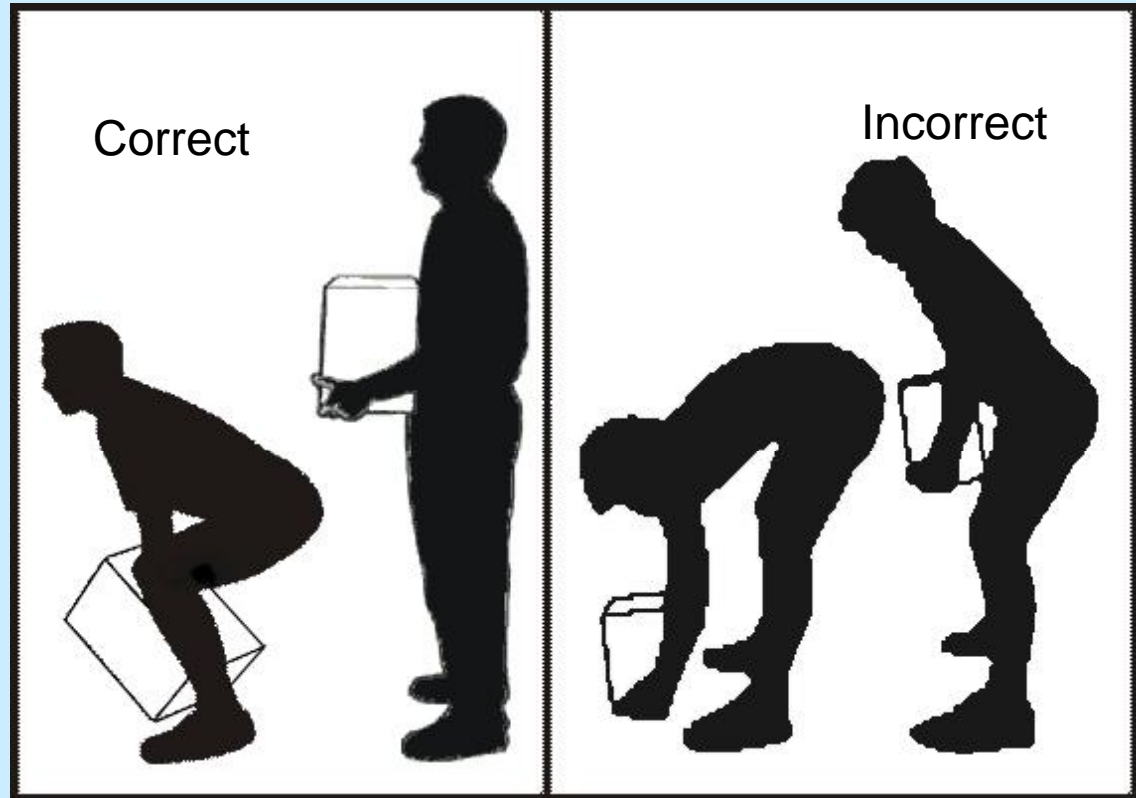
Proper Lifting

First:

- Test the weight
- Plan your route

Then:

- Take a wide stance
- Bend your knees
- Get close
- Get the best hold
- Stable position
- Tighten the stomach
- Use your legs
- Keep back straight
- Lift smoothly



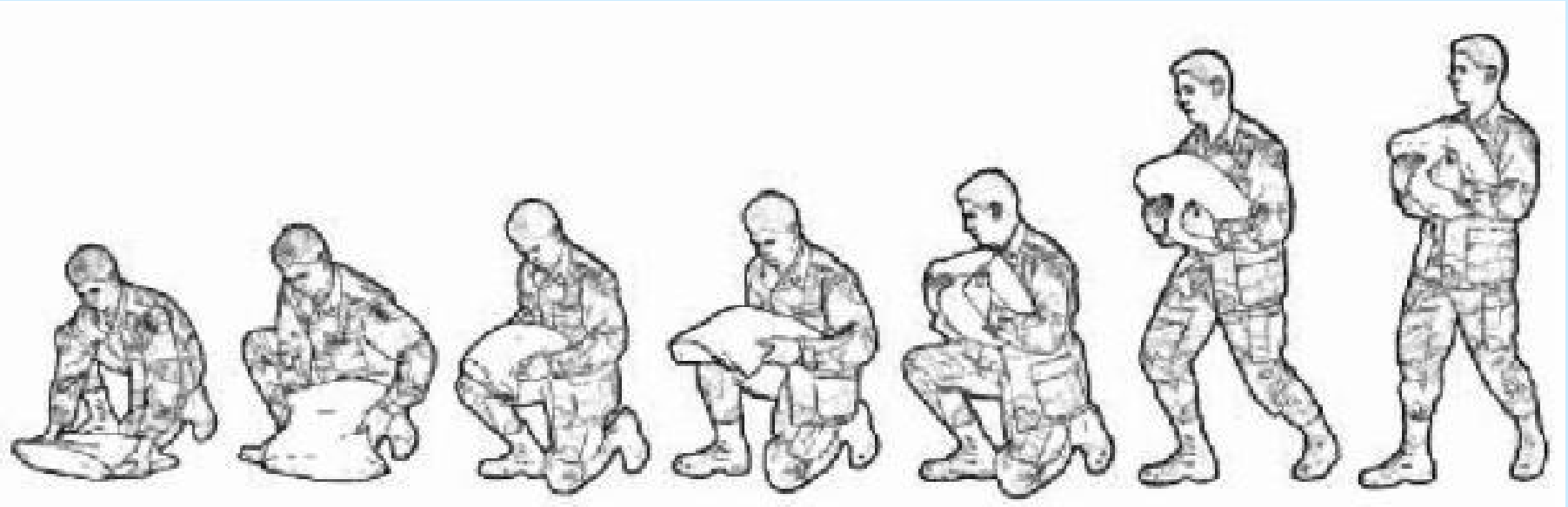
Avoid or Minimize:

- Bending and twisting
- Reaching out with the weight

Tripod Lift

U.S. Army

(an alternative for lifting bagged material)

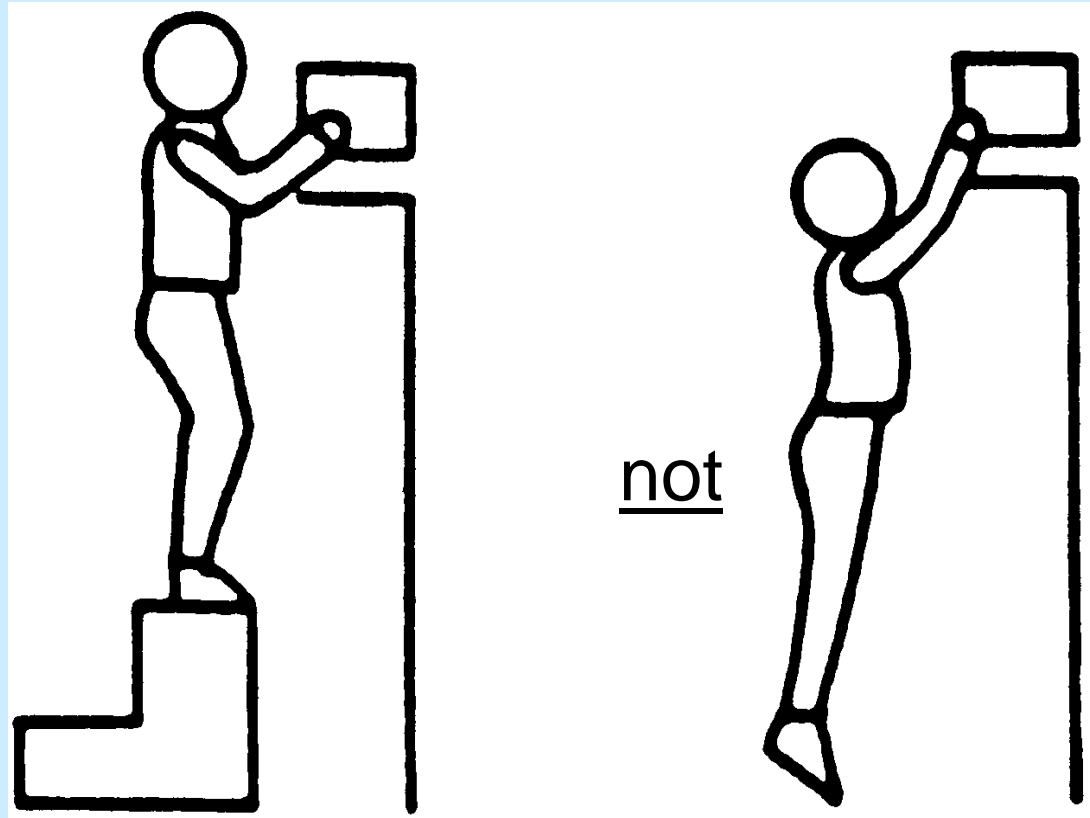


1. Slide bag to mid-thigh.
2. Lift onto opposite thigh.
3. “Hug” bag to stomach and chest.
4. Lift by extending your legs.

❖ Less arm strength required
❖ Not for those with bad knees!!

Reaching Overhead

- Wide, sturdy base of support.
- Safe platform or step stool.
- Avoid lifting above shoulder height.
- Heaviest items should be stored at waist height.



Manual Handling Of Materials

Seek help:

- When a load is too bulky to properly grasp or lift.
- When you can't see around or over the load.
- When you can't safely maneuver the load.
- When the weight is uncomfortable.



❖ Always ask yourself, “Is there a better way to do this job?”

Does this photo show the proper way to lift?



Does this look any better?



What are some injuries that result from improper lifting?

Analyze Common Activities

Consider common lifting and moving activities at your operation. Assess the risk. Can you identify the hazards and safer ways of doing the jobs? For example:

- Changing conveyor rollers.
- Handling guards during maintenance work.



What About These Jobs?



Handling
cylinders &
drums



And These?

- Handling quality control samples



- Changing & lifting screens





Safe Lifting Summary

- Be alert to the hazards that may be present.
- Break load into parts if possible.
- Get help with heavy or bulky items.
- Lift with legs, keep back straight, do not twist or bend.
- Avoid lifting above shoulder level.
- Avoid reaching out over an obstruction to lift, hold, or lower an object.
- Store heavy and frequently used items at waist height.
- Push, instead of pull.
- Use handling aids as much as possible such as steps, trestles, dollies, lift gates, wheelbarrows, come-alongs, chain hoists or jacks.
- Always look for a better way!!



Shoveling

- Wide base of support
- Knees bent
- Back straight
- Choke down on shovel
- Lift with legs
- Pivot instead of twisting



Loading and Unloading Materials

Consider:

- Load/stack secured, not too high
- Proper lifting procedures
- Adequate help
- Personal protective equipment
- Pinched hand/finger hazards
- Tripping hazards/footing
- Proper chocking and blocking
- Proper size and type of tools and lifting equipment.



Housekeeping

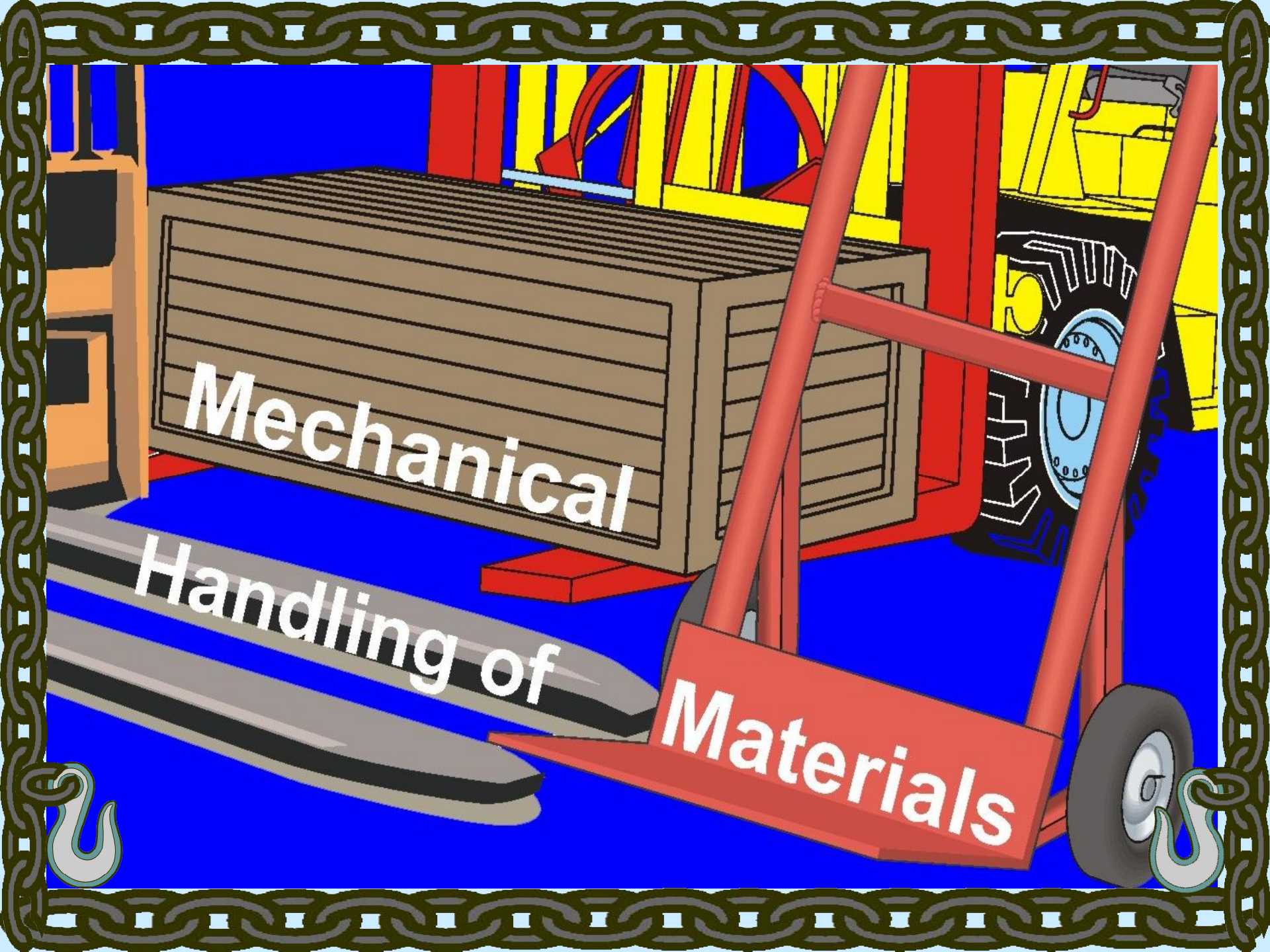


- How does good housekeeping improve safety?
- How does it reduce material handling hazards?



- What hazards do you see in these pictures?





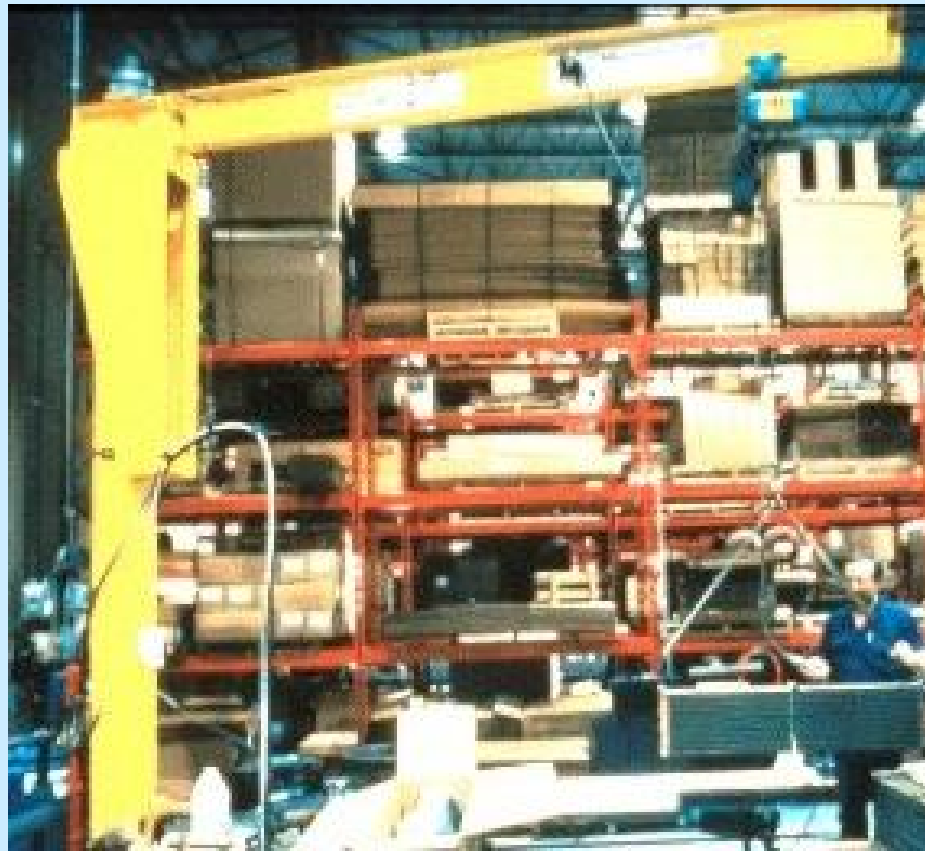
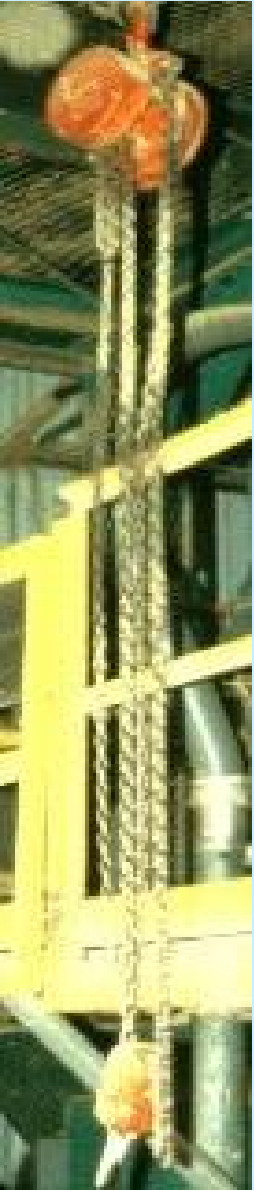
Mechanical

Handling of

Materials



Hoists



Hoists (General)

- Capacity is sometimes marked on the housings. If not, manufacturer's recommended capacities should be readily accessible, and followed!
- Attachment to supports should be according to manufacturer's recommendations.
- Adequate supports of substantial construction, capable of handling the load to be lifted.
- Persons operating must be fully task trained.
- Pre-operational Inspections are required.
- Limiting devices must be in place and functioning properly.
- Proper lifting procedures followed at all times, per manufacturer's recommendations.
- No riders, unless designed by the manufacturer for such use.

Hand-Operated Chain Hoists

- Strong/dependable/durable.
- Always consult operational material supplied by the manufacturer as to type and capacity.
- Load safety factor must never be exceeded.
- Supports sufficiently strong – substantial construction matching or exceeding the capacity of the hoist.
- Safe lifting/handling procedures must always be followed.
- Maintain hoist according to the manufacturer's recommendations.



Jacks, Port-a-Powers, Come-Alongs, Etc.



- Constant inspection; before, during and after use.
- Tag out of service if excessive wear and tear are observed.
- Proper support and blocking.
- Always operate and maintain per manufacturer's recommendations.



Dollies (Hand Trucks) and Carts

Non-powered Hand Trucks & Carts

- Get help with awkward/oversized objects.
- Heavy objects on bottom.
- Load over axles.
- Not above eye level.
- Load secure to truck.
- Firm grip.
- Back straight.
- Lean & walk, pushing forward.



Watch for:

- Obstructions
- Vehicles
- People
- Ground or floor



Dollies (Hand Trucks) and Carts

Powered Hand Trucks & Carts

- Operator task training.
- Follow manufacturer's manual.
- Heavy objects on bottom.
- Face travel direction.
- Hands on handle.
- Handle-release automatic shut-off equipped and working.
- Traffic rules observed.
- Stop & look.
- No riders.

Watch for:

- Obstructions
- Vehicles
- People
- Ground or floor



Forklifts....

.... Are mobile equipment and are to be operated and maintained per DMM regulations:

- Lift trucks must be inspected prior to operation.
- Operators must be fully task trained.
- Wear seat belts and/or other restraint devices provided.
- All traffic rules must be observed.
- When ascending or descending grades, loaded trucks must be driven with the load upgrade.
- No one should stand under the elevated portion of the truck.
- When unattended, lower forks and set the brake. If on a grade, chock wheels.
- Damaged or defective trucks must be removed from service and tagged out.
- No riders, unless there's an approved seat and seat belt.

Other Safe Operating Procedures

- Center the load on the forks and as close to the mast as possible to minimize the potential for the truck tipping or load falling.
- Handle only stable loads.
- Overloading a lift truck makes it hard to control and could make it tip over.
- Place the load at the lowest position for traveling.
- Drivers must slow down and sound the horn at cross aisles and blind spots.



More Good Practices

- Keep speed low - you may have to stop.
- Be careful when making sharp turns with a raised load.
- If a load blocks your view, travel in reverse.
- Keep arms and legs inside the truck.
- Don't drive with forks raised.
- Cross railroad tracks diagonally.
- Fuel tanks shall not be filled while the engine is running, except diesels.

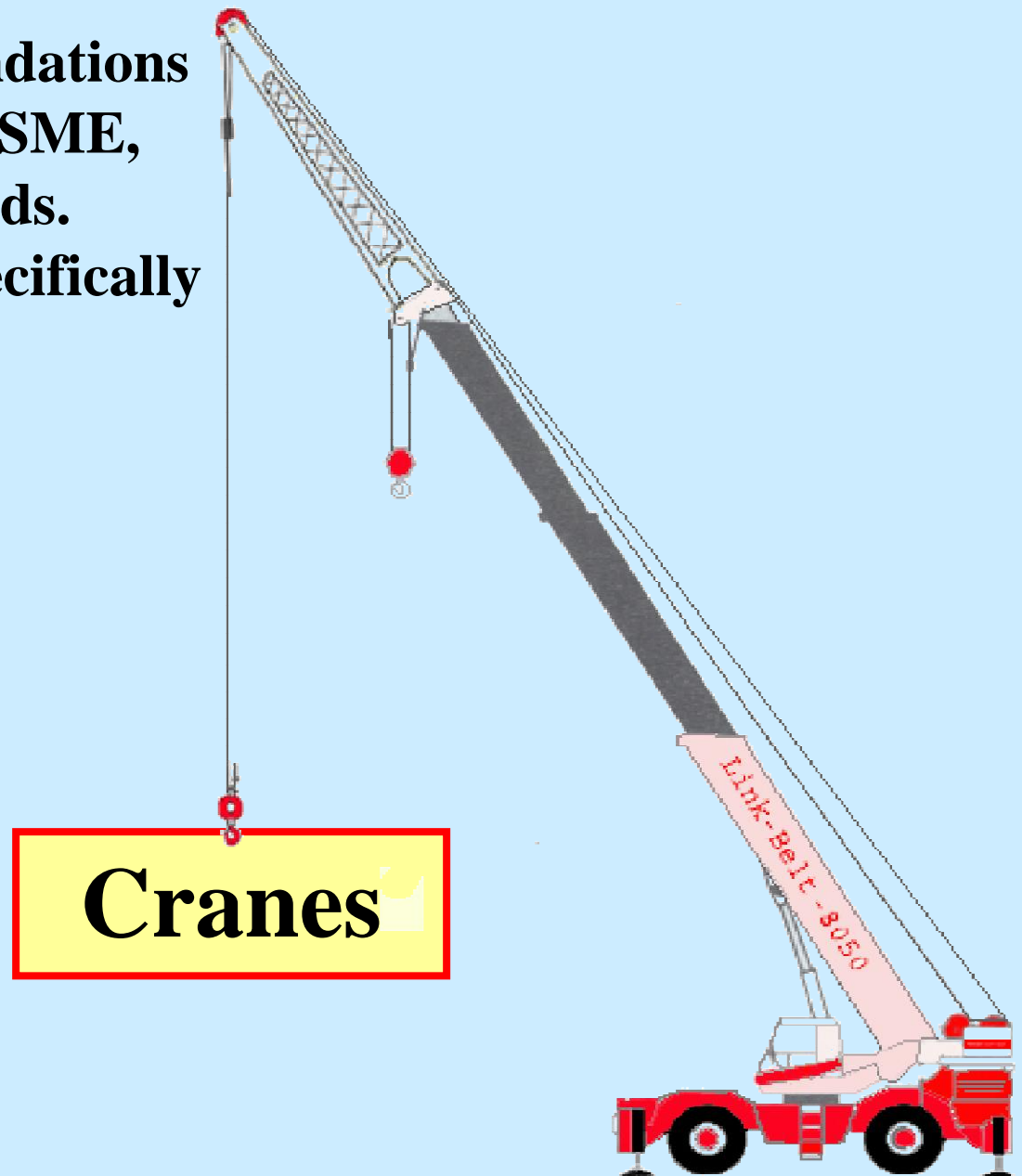


Pallet Loads

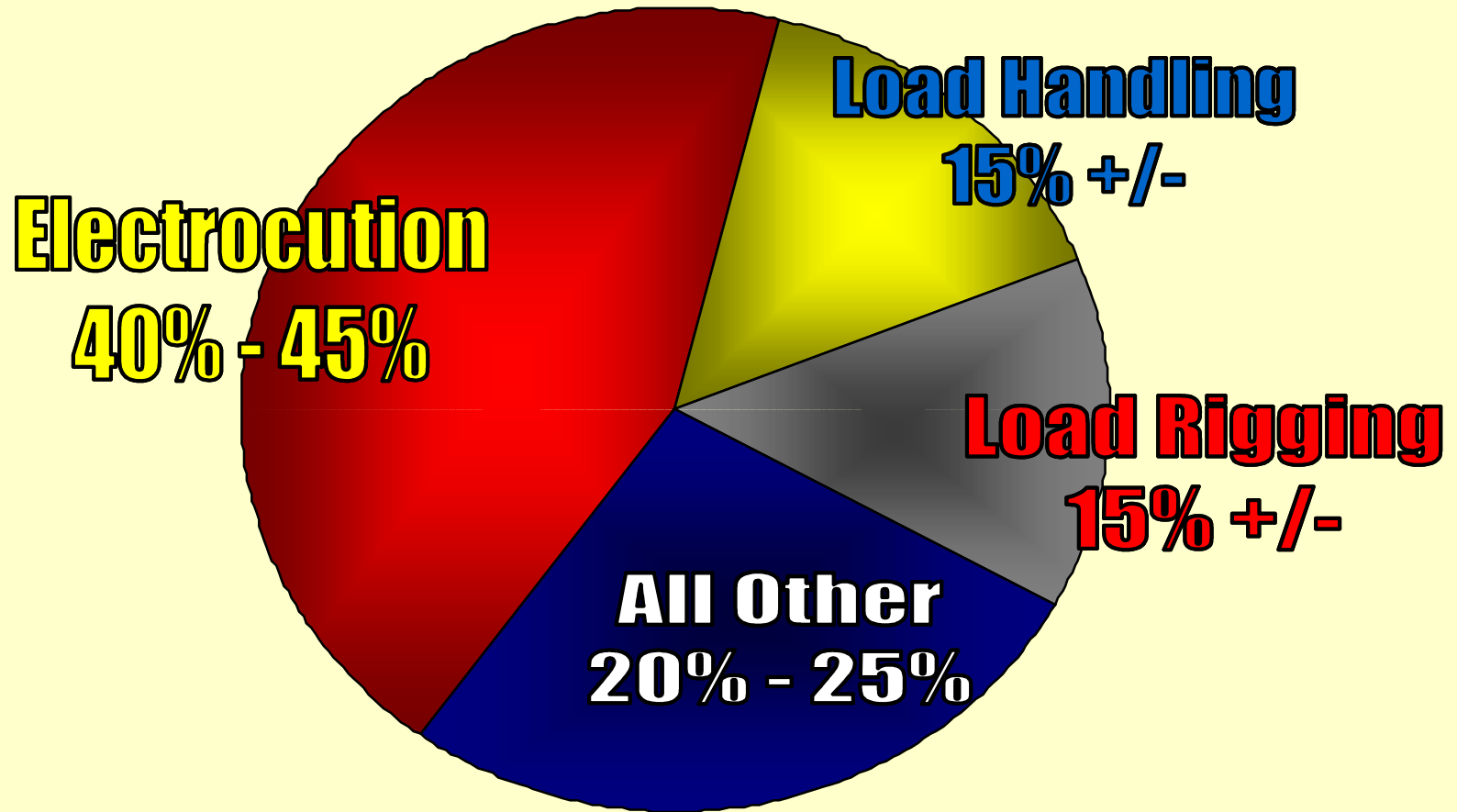
- Are these pallet loads secure and stable?
- What is likely to happen when they are moved by a truck?



❖ **Information/recommendations in this section based on ASME, ANSI and OSHA standards. DMM regulations are specifically noted.**

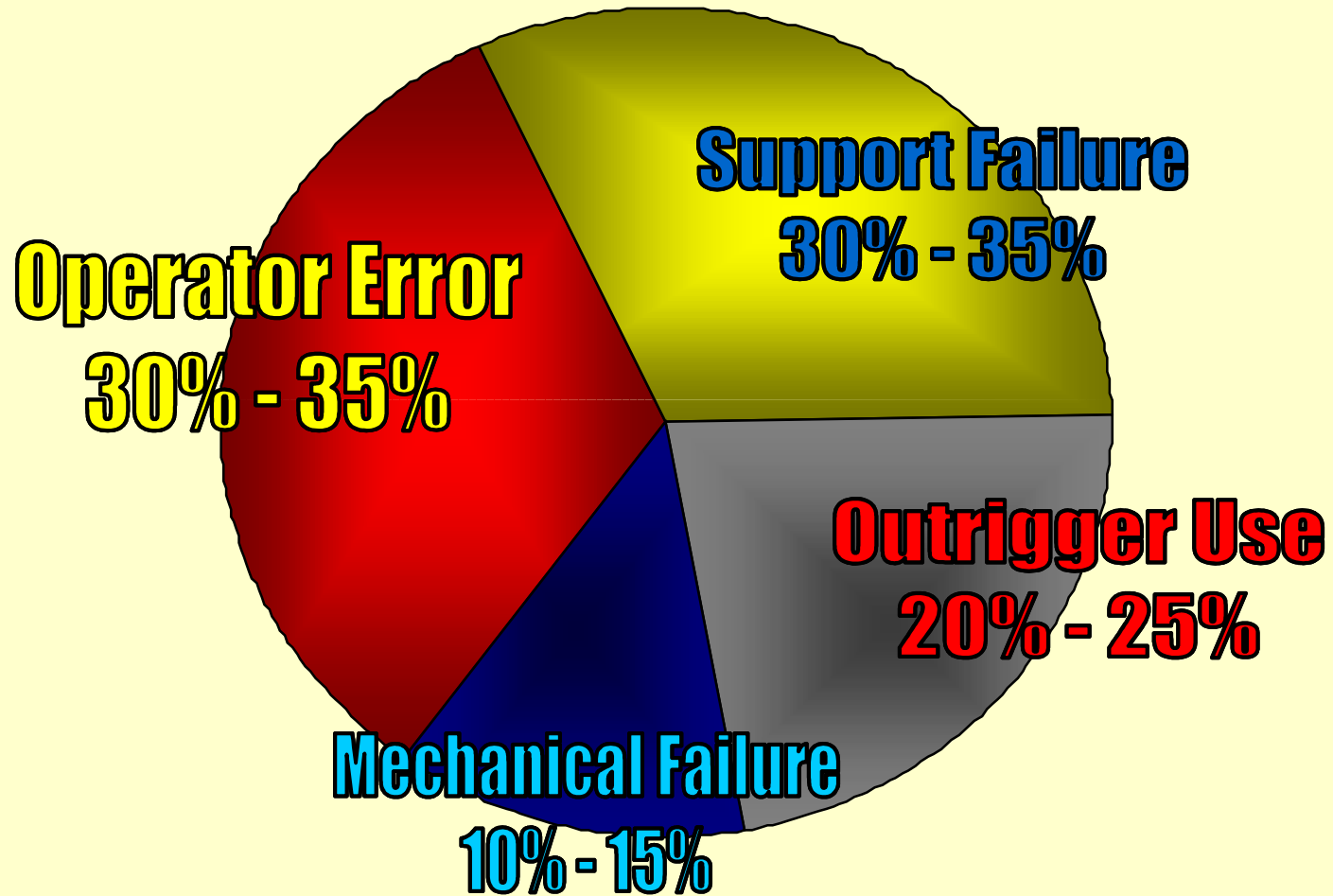


Causes Of Fatalities In Construction



20% – 25% of all construction fatalities are crane related!

Causes Of Accidents



Hazards In Crane Use

- Power line contact
- Swing radius crushing
- Structural failure
- Rigging failure
- Tip-over



❖ DMM regulations call for 10 feet of clearance to be maintained between equipment and power lines unless the lines are de-energized or other precautions are taken.

Key Factors In Crane Failure

- **Improper setup**

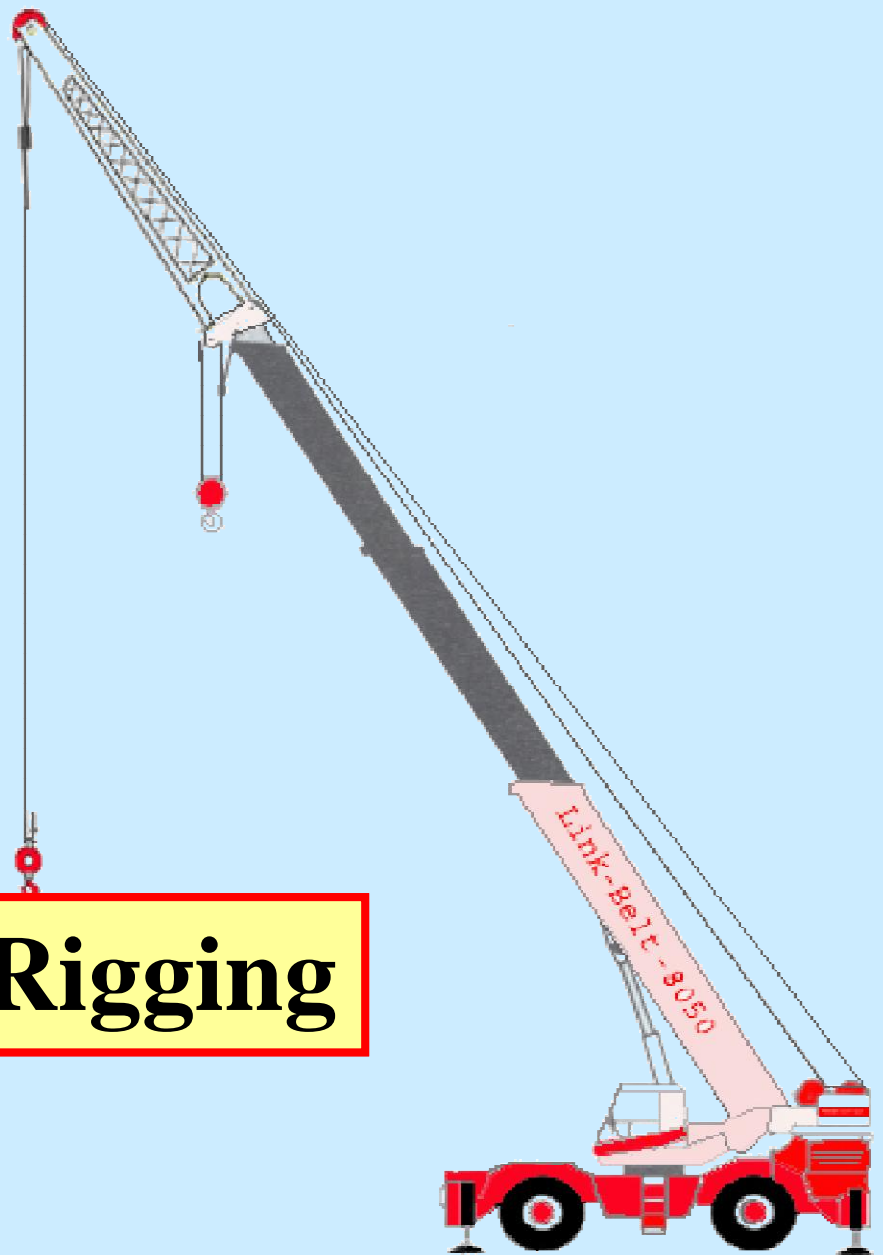
- Inadequate outrigger cribbing/use.
- Unstable ground (Utilities, un-compacted soil, etc.)
- Un-level crane (**Reduction in capacities up to 50%**)
- Inspection failure - damaged components in use.
- Proximity to overhead power lines

- **Overload**

- Mechanical failure
- Hydraulic failure
- Impact loading
- Side loading
- Wind



Basic Rigging



- Hitch “Basket” - loading with the sling passed under the load and both ends on the hook or a single master link.



- Hitch “Choker” – loading with the sling passed through one eye and suspended by the other.

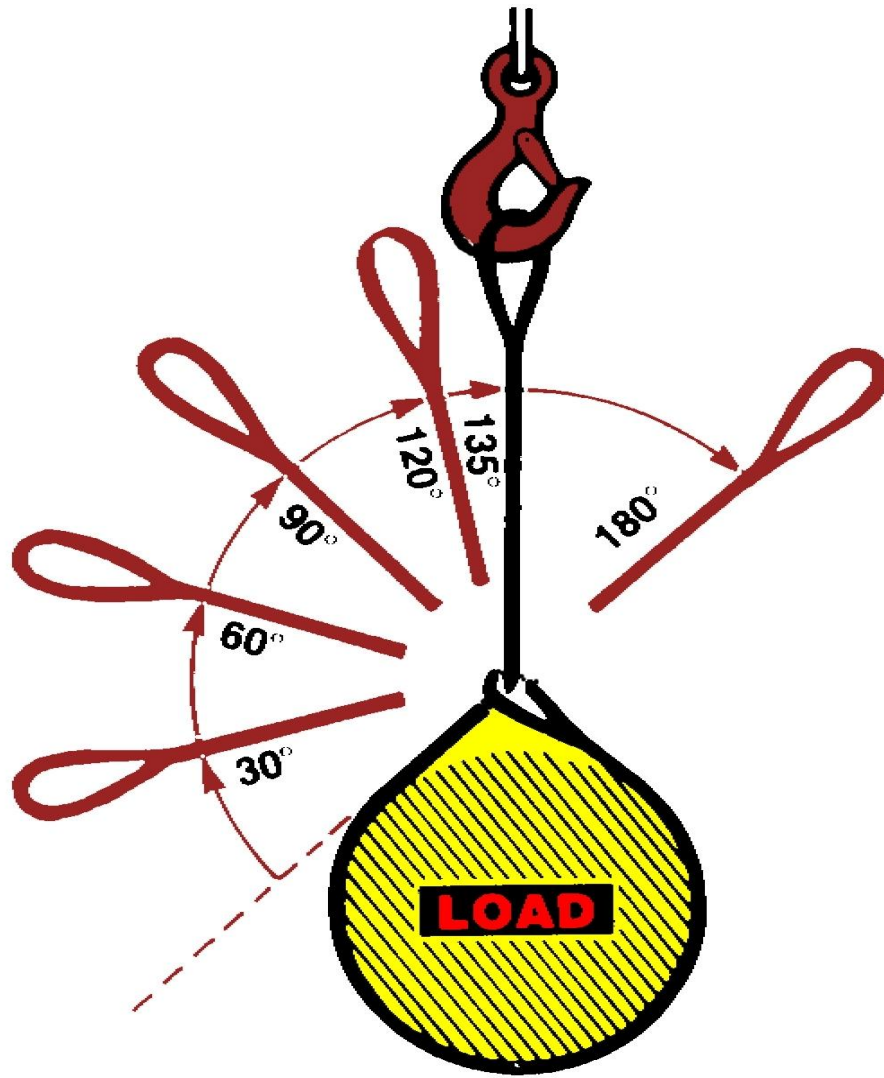


Basic Wire Rope Slings/Hitches

- Hitch “Vertical” – loading with the the load suspended vertically on a single part or leg of the sling.

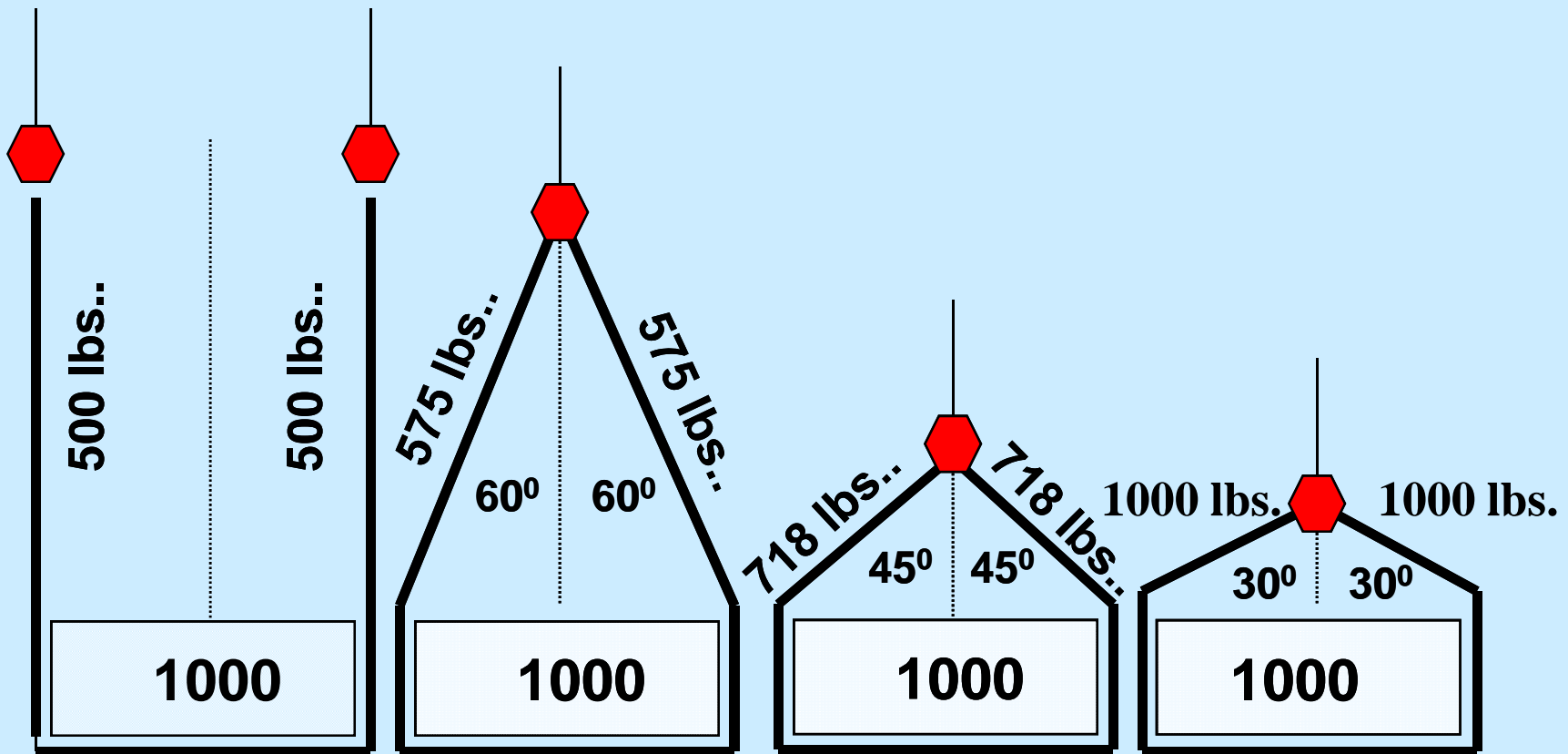


Choker Angles



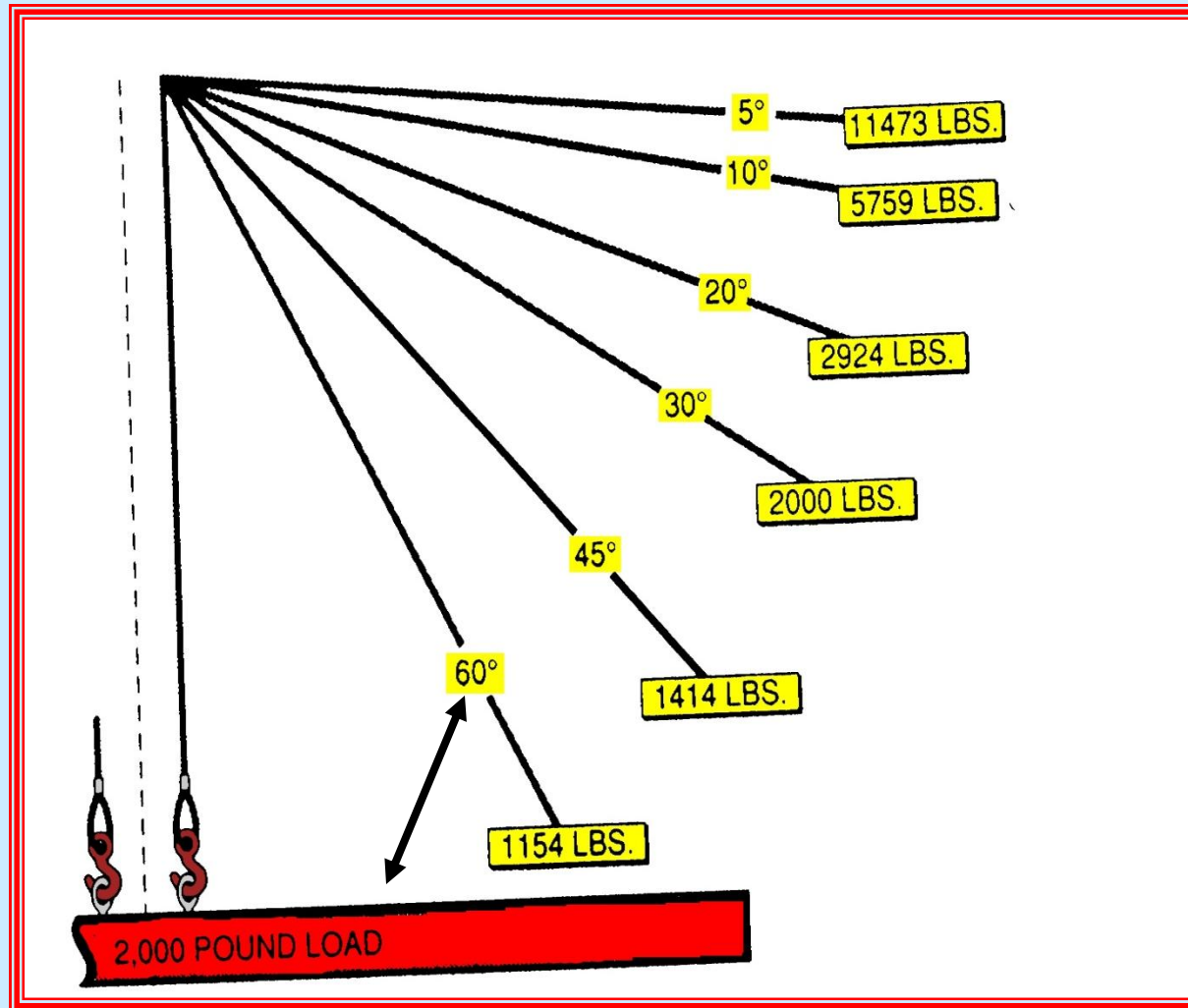
- Rated capacity decreases as the choker angle decreases.
- Usually 100% of capacity at 120 degrees or greater.
- Always refer to cable manufacturer's ratings.

How Angles Affect Sling Stress/Capacity



❖ **4VAC25-40-2580.** Hitches and slings used to hoist materials shall be of safe design and used in a safe manner.

Sling Stresses By Degree Of Angle



<u>Sling Angle To Load</u>	<u>Load Angle Factor</u>
90	1.000
60	1.155
45	1.414
30	2.000
20	2.924
10	5.747
5	11.490

❖ At 30 degrees, the 1,000 lb. load becomes (1,000 X 2.000) 2,000 lbs.

Recommendations For Wire Rope Slings From ANSI Standards

(American National Standards Institute)

Whenever any sling is used, the following practices shall be observed!

1. Slings that are damaged or defective shall not be used.
2. Slings shall not be shortened with knots or bolts or other makeshift devices.
3. Sling legs shall not be kinked.
4. Slings shall not be loaded in excess of their rated capacity.
5. Slings used in a Basket Hitch shall have the load balanced to prevent slippage.
6. Slings shall be securely attached to the load.

Recommendations From ANSI, con.

7. Slings shall be padded or protected from the sharp edges of their loads.
8. Suspended loads shall be kept free of obstructions.
9. All employees shall be kept clear of loads about to be lifted and of suspended loads.
10. Hands or fingers shall not be placed between the sling and it's load while the sling is being tightened around the load.
11. Shock loading is prohibited.
12. A sling shall not be pulled from under a load when the load is resting on the sling.

More From ANSI

Inspection of Slings



- Each day before being used, the sling and all fastenings and attachments shall be inspected for damage and defects by a *competent person designated by the employer.*
- Additional inspections shall be performed during sling use as *often as necessary* to ensure the safety of the operation.

Replacement Recommendations From ANSI

Replace if there is:

- Severe localized abrasion or scraping.
- Ten randomly distributed broken wires in one rope lay, or five broken wires in one rope strand in one rope lay.
- evidence of heat damage. (Cut with a torch)
- Kinking, crushing, bird-caging, or any damage resulting in distortion of the rope structure.
- Damaged, distorted or field welded hooks.
- Damaged or worn end attachments.

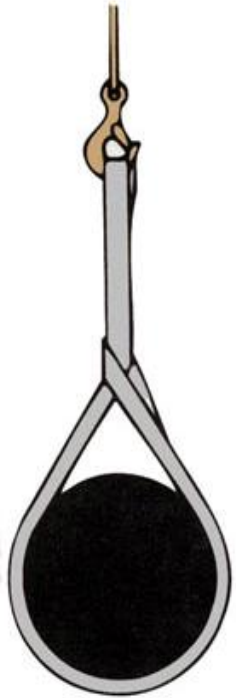
❖ ***If In Doubt, Don't Use It!***

Chain Slings

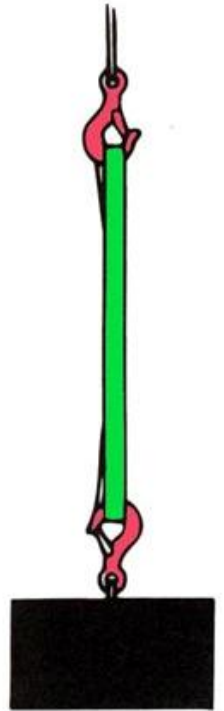
- Only **Grade 8** or better **ALLOY** Chain can be used for overhead lifting purposes! All chain is not rated the same!
- Chain must have a capacity tag attached to it.
- Chains will withstand more rough handling and abuse, but a chain with the same rated lifting capacity of wire rope will be much larger in diameter and heavier in weight.
- Chains must be inspected daily before use and as often as necessary during use to ensure safety.
- **It is the riggers responsibility to know what to look for and to do the inspections!**

Synthetic Slings

- Sling capacity varies from manufacturer to manufacturer, there is no set standard like wire rope has.
- User must look at Individual Sling Capacity Tag to determine Safe Lifting Capacity of that sling.
- If the Tag is not readable or is missing, **Do not use it!**
- Inspect sling before each days use, and as often as necessary during the day to ensure safety of sling!



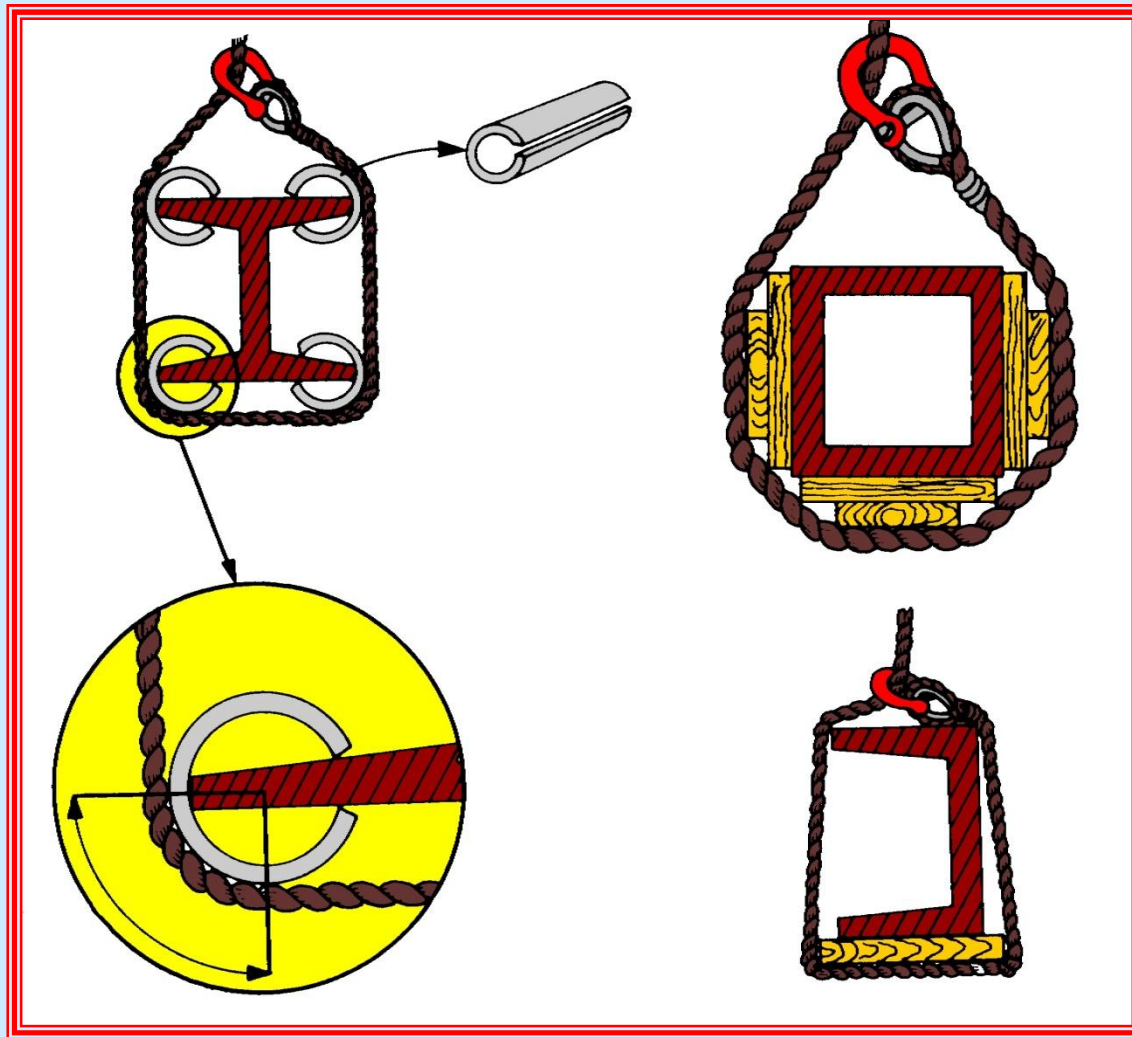
CHOKER HITCH



VERTICAL HITCH

- Sharp edges can slice a sling in two without warning as the load is tensioned. Use softeners or padding on corners.

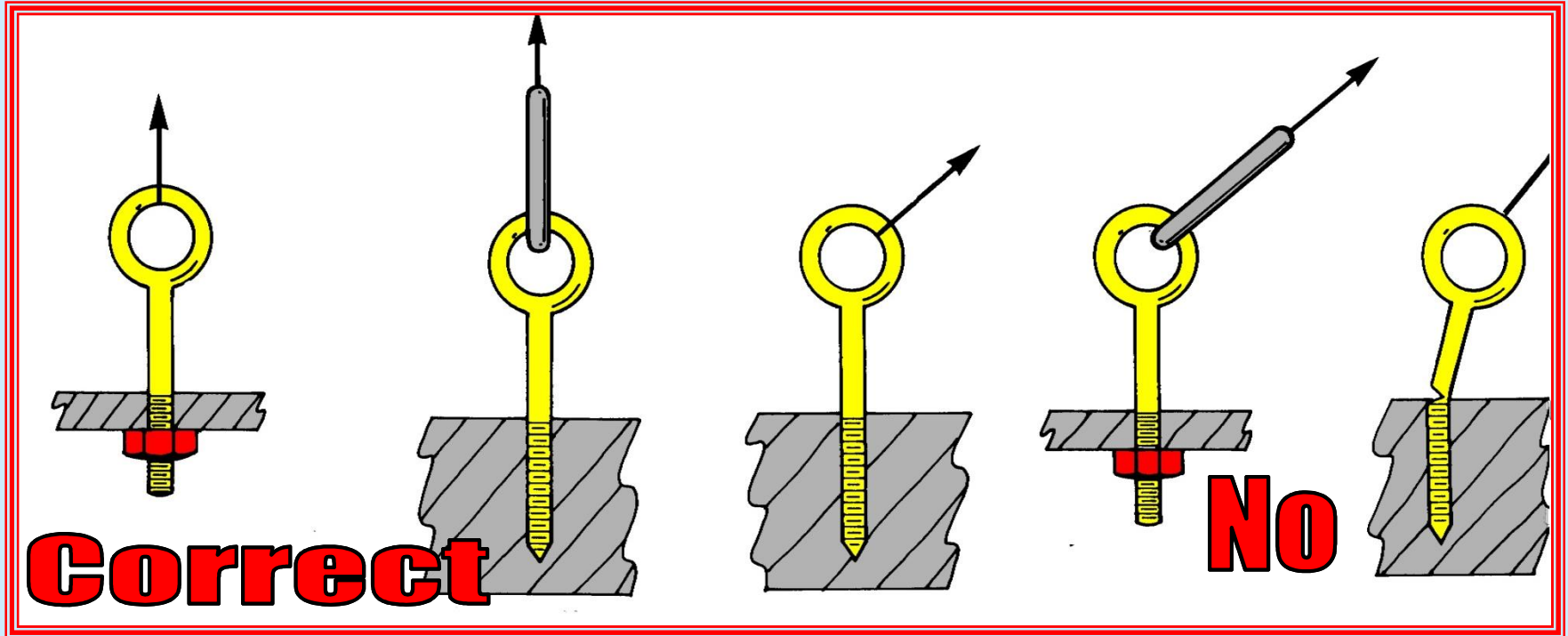
Softeners



❖ Rule Of Thumb:

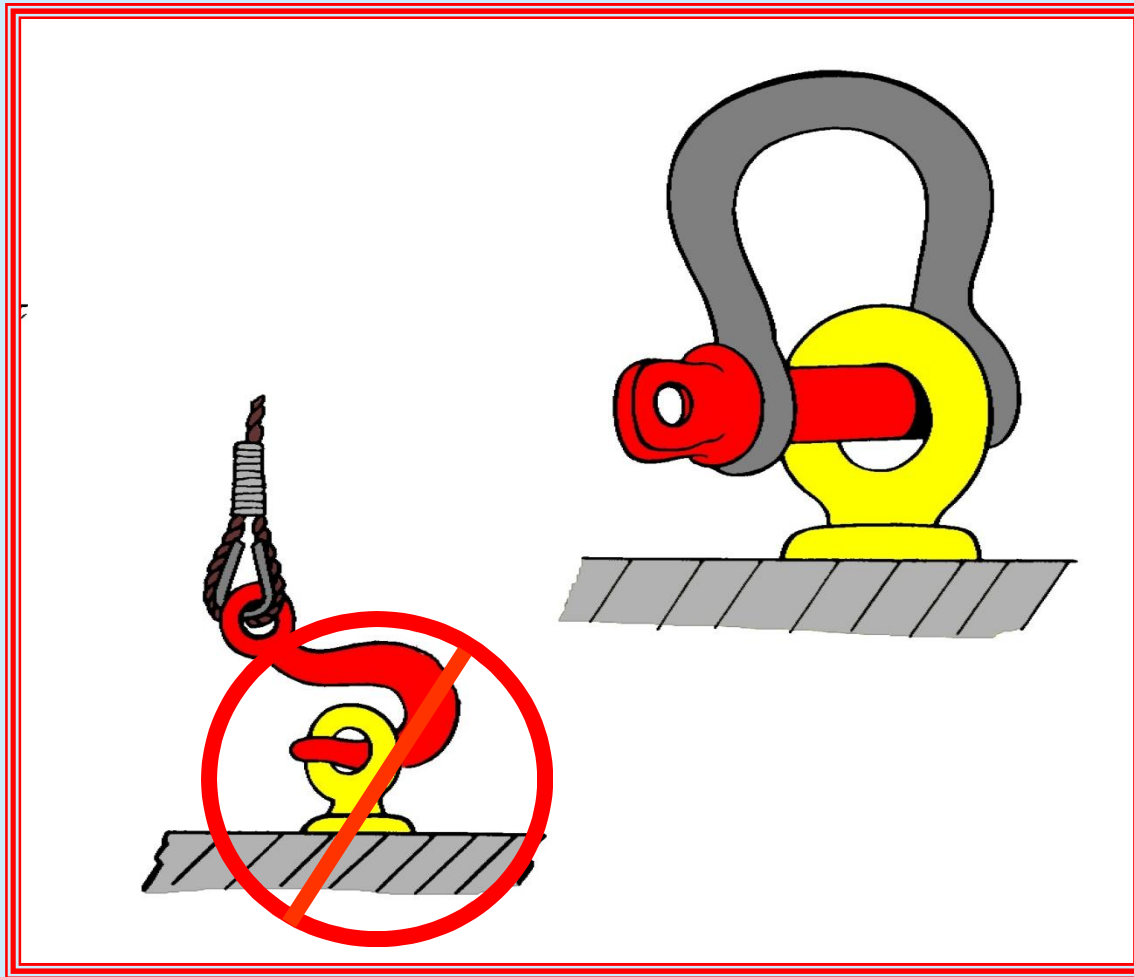
Softener should be 7 times the diameter of the cable.

Eye Bolts



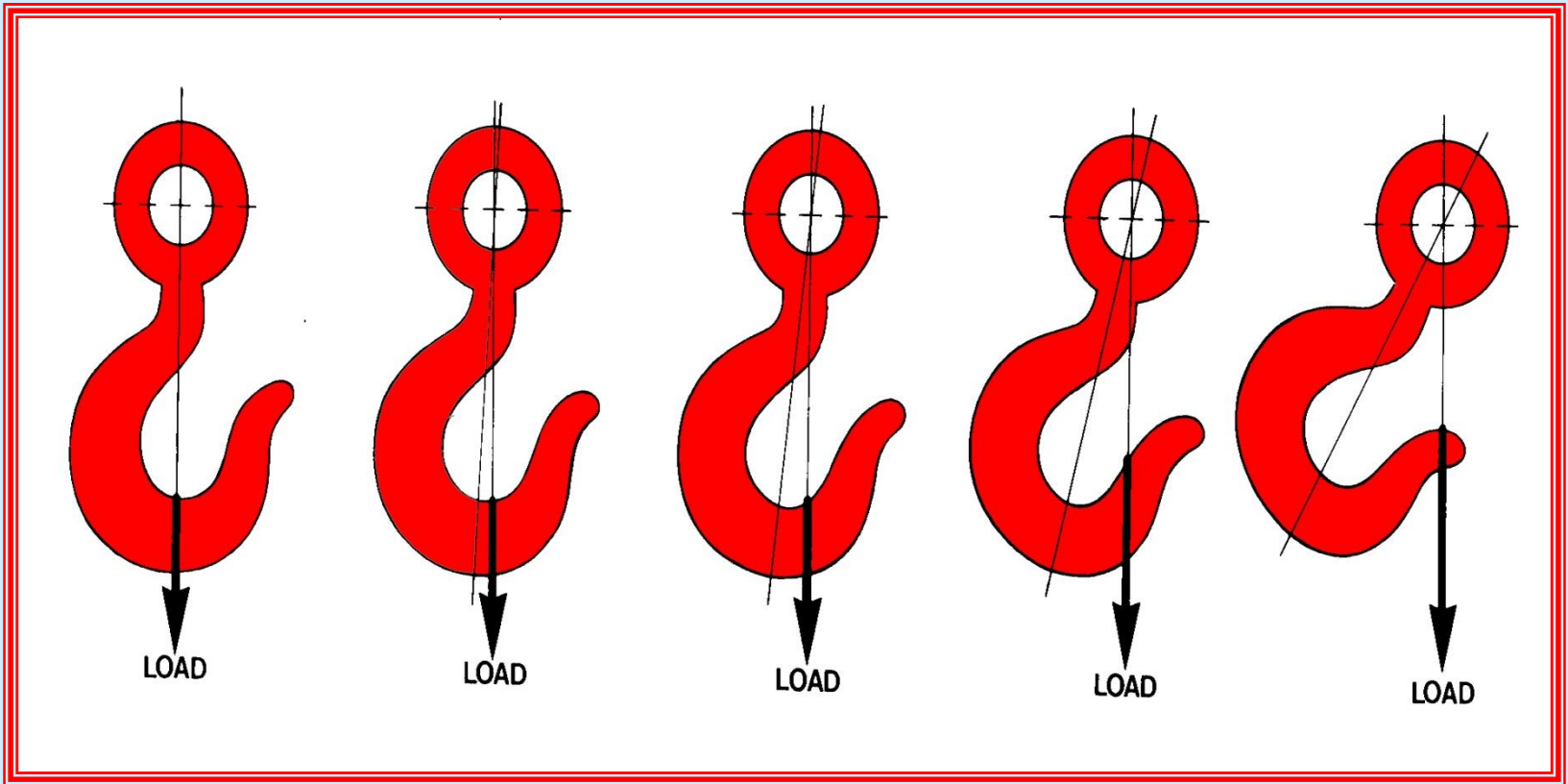
❖ Never pull on eye bolts from an angle!!

Eye Bolts



❖ If the hook will not fit, use a shackle!!

Effects On Hook Capacity



100%



40%

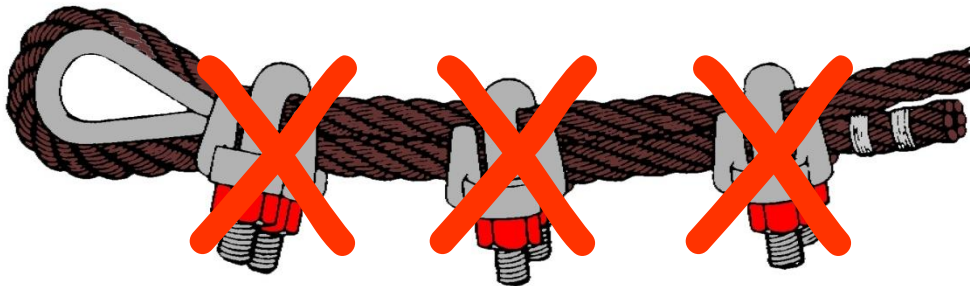
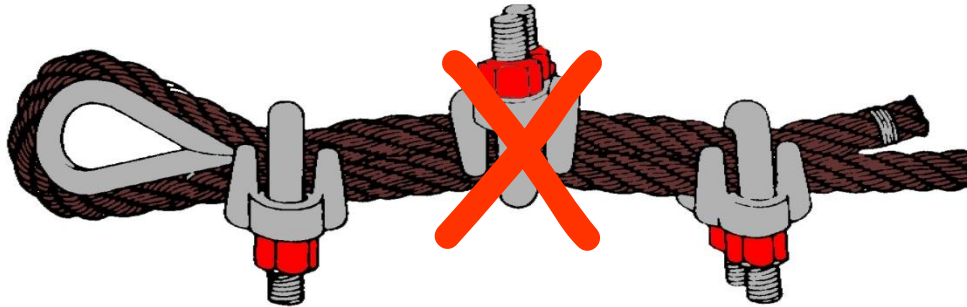
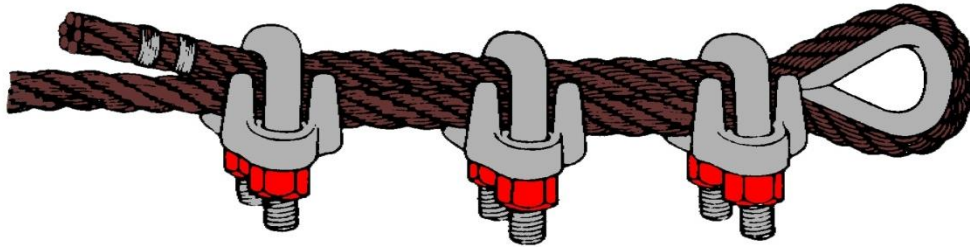
Hook Inspections

- Look for cracks, deformities or bending.
- No more than a 10 degree twist or 15% distortion of the opening is allowable.



❖ **4VAC25-40-2620.** Personnel shall not ride on loads being moved by cranes or derricks, nor shall they ride the hoisting hooks

Cable Clamps



- “Never saddle a dead horse”.

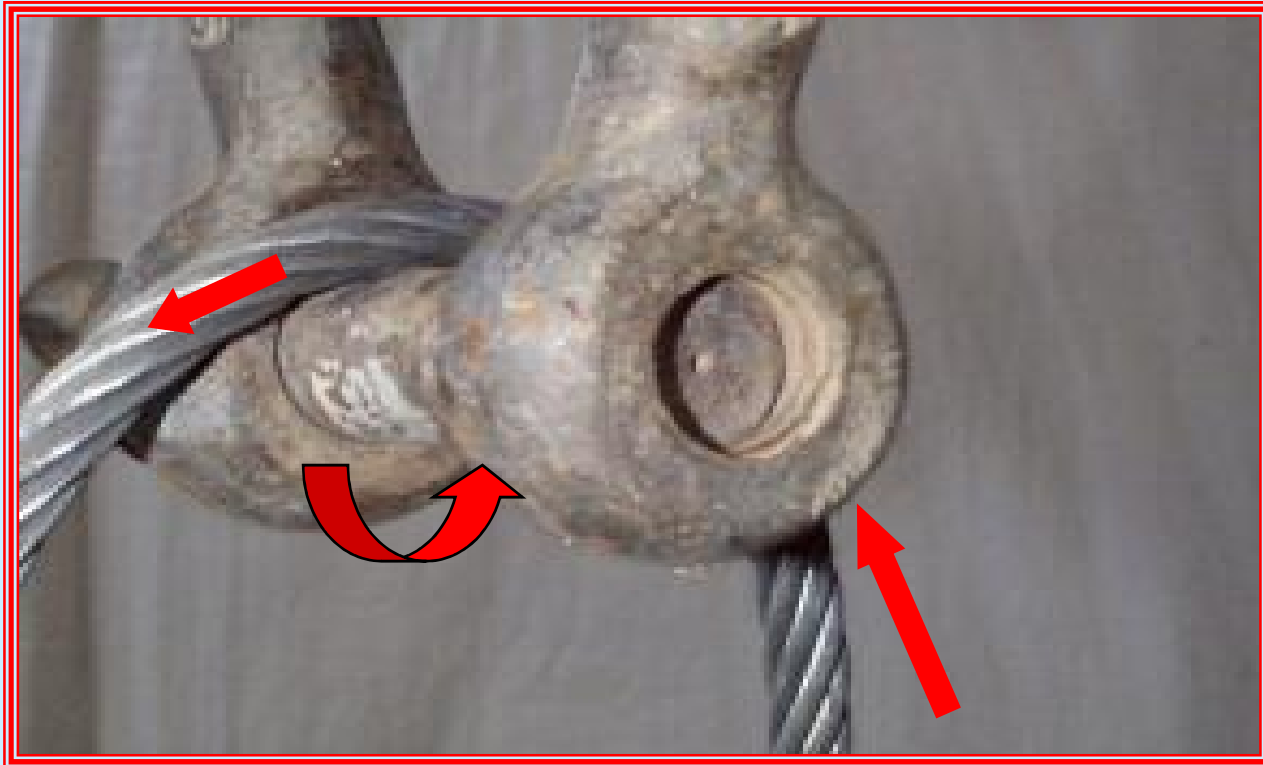
- The “U” portion of the clamp goes on the dead end of the cable.

- Many people believe it is best to turn multiple clamps opposite ways as shown in the middle illustration. This is not correct!

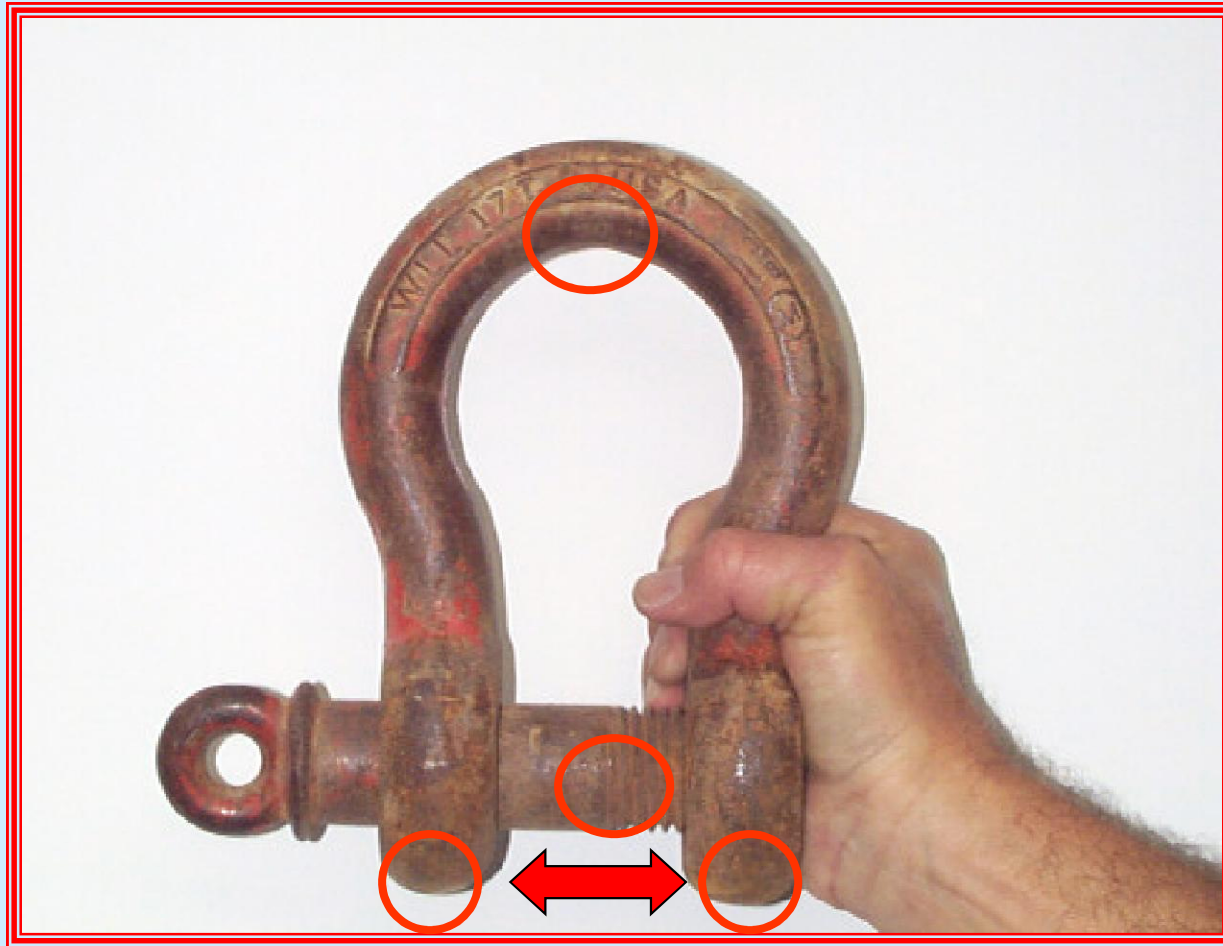
- The top illustration is the proper way.

Shackles

- Use only the proper pin, never replace with a bolt.
- Never use a screw pin shackle if the pin can roll under load.
- Always be certain the shackle is rated for the load.



Shackle Inspection



- Look for cracks, deformities, bending or change in throat opening.
- Check pin and shackle threads for ease of operation.

Suspended Loads

❖ **4VAC25-40-2590.** Tag lines shall be attached to suspended loads that require steadying or guidance.

❖ **4VAC25-40-2600.** Persons shall stay clear of suspended loads.



Protecting Rigging From Damage Or Environment

- Rigging components are expensive to buy and to replace!
- Use them properly and store them properly!
- Keep wire rope slings lubricated and all rigging stored out of the weather.
- Treat the rigging as though your life depended on it! *Because it does if it fails!*
- Don't use makeshift rigging or attempt to repair any rigging components.
- Knots tied in rigging reduces the strength by 50% or more!

Crane Inspections



Regular Inspections

- Divided into two general classifications:
 - Frequent and Periodic
- These inspections are based on:
 - Intervals of inspection
 - Components to be inspected



Frequent Inspections

- Daily to Monthly (each use)
- Inspected by a competent person (operator?)

- Controls
- Hooks and latches
- Mechanisms
 - Maladjustment
 - Wear
- Running cables
- Electrical apparatus
- Hydraulic system
- Safety devices
- Tires
- Hydraulic hoses

❖ DMM mobile equipment regulations apply to all rubber tire or track mounted cranes. Pre-operational inspections must be performed.

Periodic Inspections

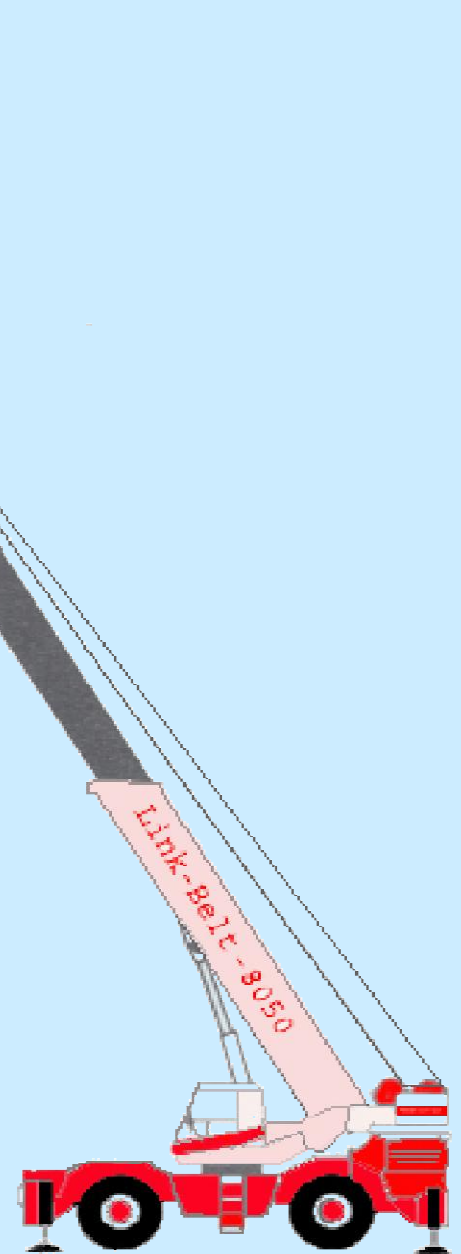
- Monthly to annually (depending on usage)
 - Inspected by a competent person (operator, mechanic, etc.)
-
- Crane structure and boom
 - Chains and sprockets
 - Bolts and rivets
 - Standing cables
 - Sheaves and drums
 - Pins, bearings, gears, rollers, etc.
 - Brakes, clutches, pawls, etc.
 - Indicators (load, boom)
 - Power plants



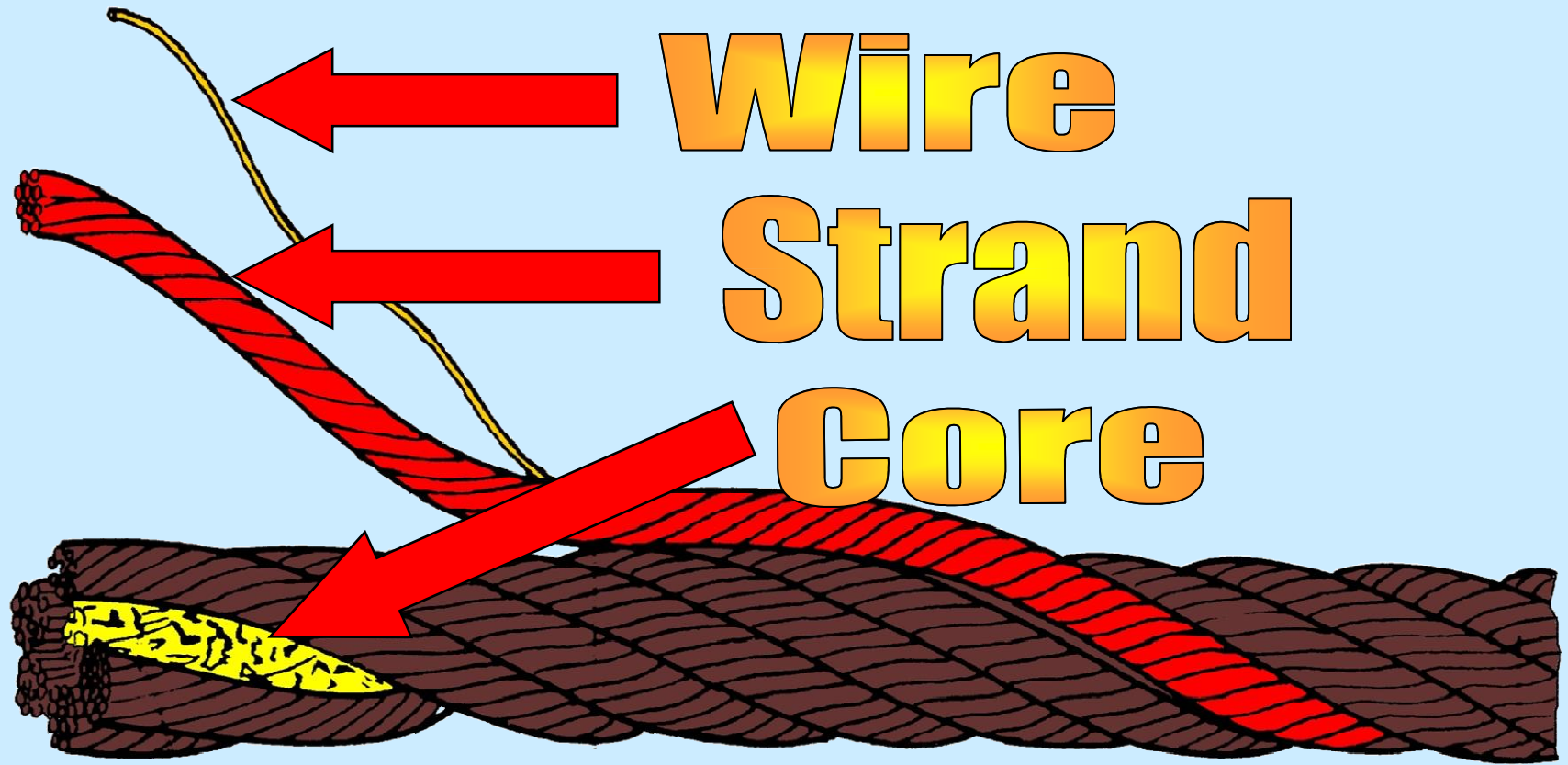
Periodic Inspections, cont.

- Monthly to Annually (depending on usage)
- Inspected by a competent person (operator, mechanic, etc.)
 - Crane hooks
 - Travel steering
 - Tires (wear)
 - Hydraulic hoses, fittings and tubing
 - Hydraulic and pneumatic pumps and motors
 - Hydraulic and pneumatic valves
 - Hydraulic and pneumatic cylinders
 - Hydraulic filters

Wire Rope Inspection



Wire Rope Components



❖ The core may be wire or a composite of other materials, even paper.

Inspections

- Frequent Inspection (daily or each use):
 - All running ropes in service should be visually inspected at least once each working day. A visual inspection consists of observation of all rope that can be reasonably expected to be in use.
 - The visual inspection should be concerned with discovering gross damage. Such as:
 - ✓ Kinking, crushing, bird caging, core protrusion
 - ✓ General corrosion
 - ✓ Broken or cut strands
 - ✓ Broken wires
 - ✓ Core failure
 - ✓ Extra attention should be given to flange points and boom hoist ropes

Inspections

- Periodic Inspection (depends on usage)

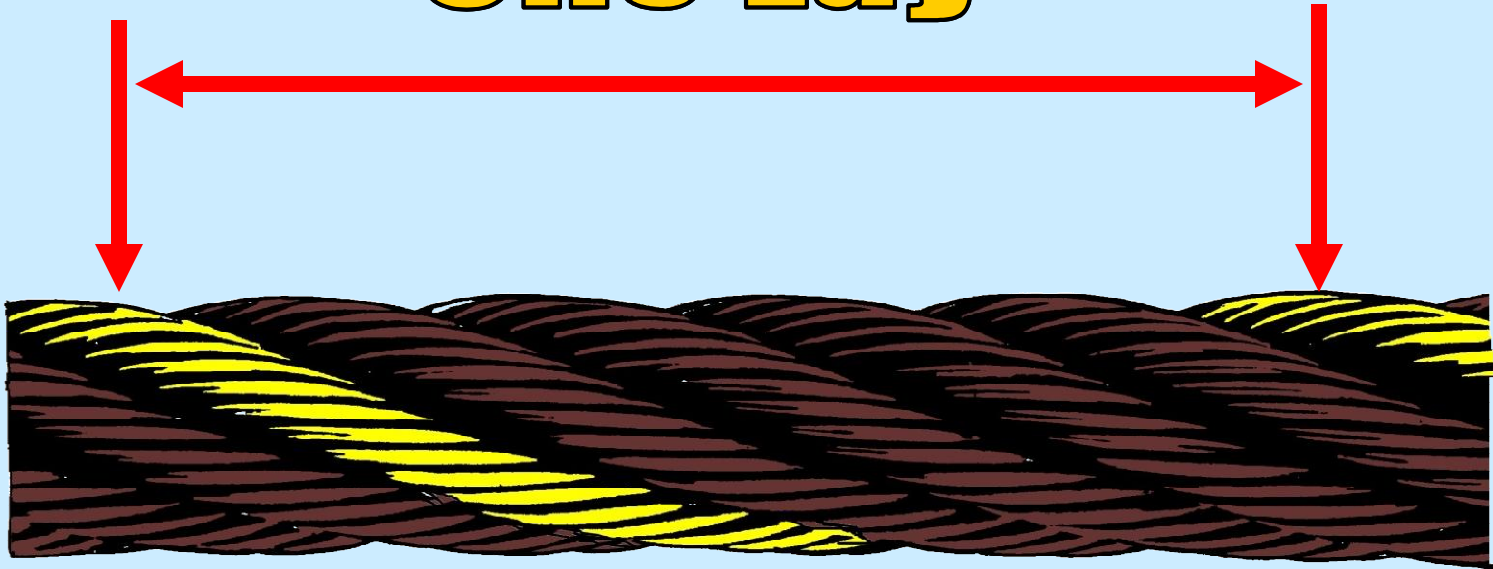
Should include the following:

- ✓ Points in “Frequent Inspection”.
- ✓ Reduction in Rope Diameter due to loss of core support or wear of outside wires.
- ✓ Internal and external corrosion.
- ✓ Wear of outside wires.
- ✓ Broken wires at end connections.
- ✓ Damaged or improperly applied end connectors.



Area/Term Of Inspection

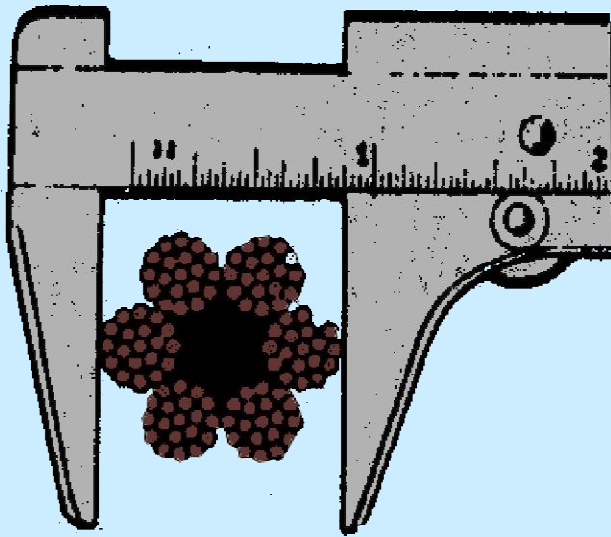
One Lay



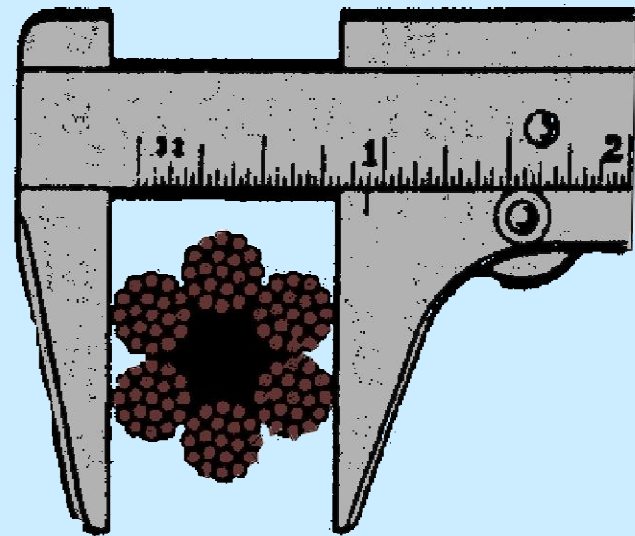
- The distance between the beginning and end of a single wrap made by one strand of cable is one lay. Important in determining the amount of wear regarding removal of the cable.

Inspection Procedure

- Determining wear; loss of diameter.



Right



Wrong

Wire Rope Removal Criteria

• Running Ropes

- 6 broken wires (random) in 1 lay. —————→
- 3 broken wires in any 1 strand of 1 lay. —————→
- Wear equal to 1/3 original diameter of outside wires.
- Severe kinking, crushing, bird caging or corrosion.
- Heat damage (any source).

❖ **4VAC25-40-388.A.1.**

Five percent of the total number of wires, or fifteen percent of the total number of wires within any strand.

❖ The remaining bullets here are in agreement with other parts of **4VAC25-40-388.**

• Standing Ropes

- More than 2 broken wires in 1 lay (not at end connection).
- More than 1 broken wire at the end connection.

Wire Rope Removal Criteria

- **Reduction in rope diameter**
(in inches)

- 1/64 for rope up to 5/16
- 1/32 for rope up to 1/2
- 3/64 for rope up to 3/4
- 1/16 for rope 7/8 to 1 1/8
- 3/32 for rope 1 1/4 to 1 1/2

❖ **4VAC25-40-388.A.7.**

Diameter reduction due to wear that exceeds 6.0% of the baseline diameter measurement.

❖ Length must allow for a minimum of two drum wraps at all times!

Wire Rope Attachments

❖ 4VAC25-40-388.B. Load end attachments:

- Wire rope shall be attached to the load by a method that develops at least 80% of the nominal strength of the rope.
- Except for terminations where use of other materials is a design feature, zinc shall be used for socketing wire ropes. Design feature means either the manufacturer's original design or a design approved by a registered professional engineer.
- Load end attachment methods using splices are prohibited.

❖ 4VAC25-40-388.C. Drum end attachment. Rope shall be replaced when there is:

- More than one broken wire at an attachment.
- Improper installation of an attachment.
- Slippage at an attachment.
- Evidence of deterioration from corrosion at an attachment.

Other Attachments And Safety Devices

- ❖ **4VAC25-40-388.D.** Wire rope attachments shall be replaced when cracked, deformed, or excessively worn.
- ❖ **4VAC25-40-388.E.** Safety devices attached to hoist ropes shall be selected, installed, and maintained according to manufacturer's specifications to minimize internal corrosion, weakening and breaking of the hoist rope.



Overhead Cranes

- ❖ **4VAC25-40-2650.** Overhead cranes with operator cabs shall be provided with:
 - Bumpers at each end of each rail.
 - Automatic switches to halt up-travel of the blocks before they strike the hoist.
 - Effective audible warning signals within easy reach of the operator.
 - A means to lock out the disconnect switch.
- ❖ **4VAC25-40-2660.** No person shall work from or travel on the bridge of an overhead crane unless the bridge is provided with substantial foot-walks with toe-boards and railing the length of the bridge.

Mechanical Handling of Materials

Summary

- Proper task training for all personnel.
- Get help when needed.
- Watch for struck-by/crushed-by dangers.
- Maintain safety equipment, no unauthorized modifications.
- Inspect all hoists frequently and thoroughly. Know and abide by load limits. Operation and maintenance according to manufacturer's recommendations.
- Forklifts – pre-op inspections required; if defective, remove from service and tag. Keep loads low, speed slow and load uphill on grades.
- Cranes – pre-op inspections required as well as frequent checks of all cables and rigging. Any defective components must be removed from service. Stay clear of suspended loads and use tag lines.

Stacking and Storage



Stacking and Storing Materials



- Secure materials by proper stacking, racking, blocking, or interlocking to prevent falling, sliding or collapse.
- Be certain materials are kept in acceptable containers and appropriately labeled.
- Address specific fire hazards associated with stored materials; type, size and number of fire extinguishers available, emergency plans, etc.
- Keep aisles and passageways clear of obstructions.
- Have proper PPE readily available for handling any materials stored in an area.
- Post safe load limits of floors, racks, shelves and supports where it may be an issue.
- Post other appropriate signage.



Serious Injuries Could Result If These Materials Were To Fall



- Always be aware of your surroundings and what's going on.
- When entering an area, the first thing you should do is look around for possible hazards.



- Don't forget to look up!!
- Report unsafe conditions immediately.

❖ **4VAC25-40-2540.** Materials shall be stored and stacked in a manner which minimizes stumbling or fall of material hazards.

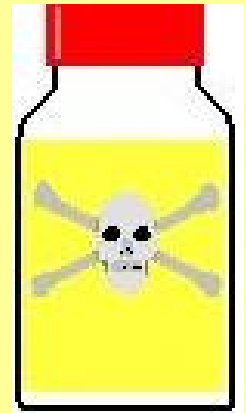
Hazardous Materials



➤ **Labeling**

➤ **PPE**

➤ **DMM Regulations**



National Fire Protection Association

“Hazard Diamond”



The (Red Diamond)
Tells Us.....

**NFPA/Fire
Hazard**

FIRE HAZARD
FLASH POINTS:
4-BELOW 73 F
3-BELOW 100 F
2-BELOW 200 F
1-ABOVE 200 F
0-WILL NOT BURN

The (Blue Diamond)
Tells Us.....

NFPA/Health

HEALTH HAZARD:
4-DEADLY
3-EXTREME DANGER
2-HAZARDOUS
1-SLIGHTLY HAZARDOUS
0-NORMAL MATERIAL

National Fire Protection Association

“Hazard Diamond”



**The (Yellow Diamond)
Tells Us.....**

**The (White Diamond)
Tells Us.....**

NFPA/Reactivity

REACTIVITY:

4-MAY DETONATE

**3-SHOCK AND HEAT MAY
DETONATE**

2-VIOLENT CHEMICAL CHANGE

1-UNSTABLE IF HEATED

0-STABLE

**NFPA/Specific
Hazards**

SPECIFIC HAZARDS:

Oxidizer - OXY

Acid - ACID

Corrosive - COR

Use NO WATER - ~~W~~

Radiation - 

A Key Fact To Remember; The Numbers Show Degree Of Hazard

0 = Minimum hazard

1 = Slight hazard

2 = Moderate hazard

3 = Serious hazard

4 = Severe hazard

Example: A label with a 4 in its red section means a high degree of risk, if you don't handle the chemical correctly.

FLAMMABLE

- 4 Extremely flammable
- 3 Ignites at normal temperatures

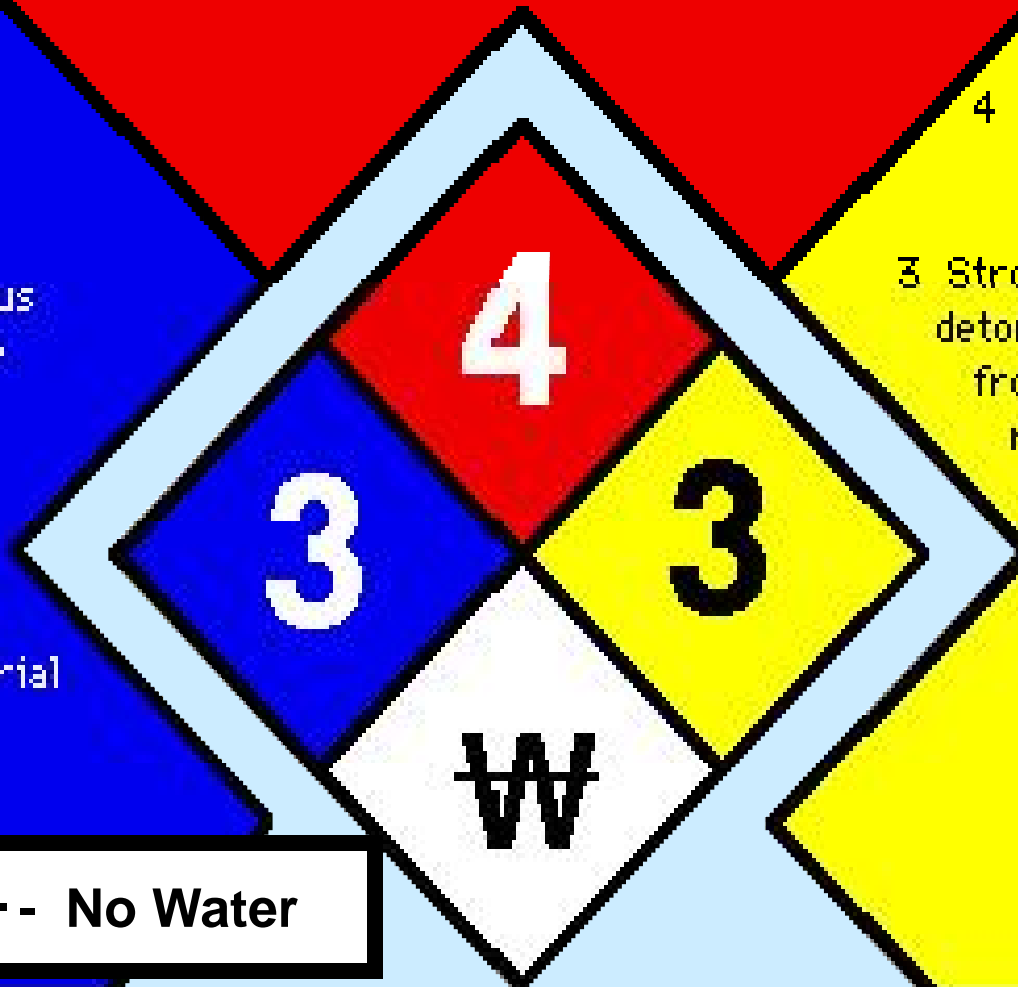
- 2 Ignites when moderately heated
- 1 Must be preheated to burn
- 0 Will not burn

HEALTH

- 4 Too dangerous to enter vapor or liquid
- 3 Extremely dangerous use full protective clothing
- 2 Hazardous - Use breathing apparatus
- 1 Slightly hazardous
- 0 Like ordinary material

REACTIVITY

- 4 May detonate - Vacate area if materials are exposed to fire
- 3 Strong shock or heat may detonate - Use monitors from behind explosive resistant barriers
- 2 Violent chemical change possible - Use hose streams from distance
- 1 Unstable if heated - Use normal precautions
- 0 Normally stable



~~W~~ - No Water

Labels May Or May Not Use The NFPA “Hazard Diamond”

- Always read, and heed, the label.
- Know where MSDS's are kept and refer to them if uncertain how to handle a material.
- When in doubt, ask questions until confident.

SuperClean Anything Cleaner

MSDS #: 84945 PPE: Gloves
Mix: 1oz. /32 oz.
Super Chemical Corporation
123 Chemical Drive
New York, NY 34344

Emergency Phone: 800-555-5555

Target: Lungs, Stomach
Contents:
Sodium Chloride, Benzine, Petroleum

Directions:
IF SWALLOWED: Induce vomiting, contact physician.
IF SKIN CONTACT: Wash thoroughly with cold water and soap,
contact physician if irritation occurs.

ABC Cleaning Corporation

❖ Labels may look quite different as long as the required information is present!

MSHA's HAZ-COM Rule

Key Elements:

- Hazardous materials/chemicals must be identified. A list/record must be kept as long as the material is on the mine property.
- All materials/containers must be properly labeled to identify the contents and the specific hazards associated with those materials.
- MSDS must be kept on all hazardous materials and be readily available to personnel working with those materials.
- All personnel working with or exposed to hazardous materials shall be trained in proper handling and use of those materials. They must review and understand the information provided in the MSDS. A record of the training must be kept.

How Chemicals Enter Your Body

There are three main routes of entry:

- Skin and eye contact
- Swallowing
- Inhaling



❖ **4VAC25-40-2530.** Acceptable protective clothing, respiratory protection, gloves, and goggles or face shields, accepted by the National Institute for Occupational Safety and Health (NIOSH) or other approved agency shall be worn by persons exposed to chemical substances that are corrosive, flammable, reactive, or toxic.

Other DMM Hazardous Materials Regulations

- ❖ **4VAC25-40-2520.** Water or neutralizing agents shall be available where corrosive chemicals or other harmful substances are stored, handled or used.
- ❖ **4VAC25-40-2560.** Materials that can create hazards if accidentally liberated from their containers shall be stored in a manner that minimizes the dangers.
- ❖ **4VAC25-40-2570.** Corrosive, flammable, reactive, and toxic materials shall be stored in acceptable containers and shall be labeled appropriately.
- ❖ **4VAC25-40-2630.** Substances that react violently or liberate dangerous fumes when mixed shall be stored in such a manner that they cannot come in contact with each other.

Personal Protective Equipment (PPE)

(In General)

Gloves & Footwear

- For loads with sharp or rough edges, wear gloves or other hand and forearm protection. Be sure to have the proper gloves for hot and chemical materials or other materials with special hazards.
- Steel toe shoes are required where there is danger of injury. When loads are heavy or bulky, metatarsal protection may add an extra measure of safety.



❖ Part X of DMM's Safety and Health Regulations covers PPE, 4VAC25-40-1690 through 1800.

More On PPE

- Hard hats need to be worn where falling objects may create a hazard. This includes hazards from material stored or handled overhead.
- Special safety glasses, goggles or face shields may be needed.
- Special clothing may be needed.
- Respirators or other special breathing apparatus may be necessary.
- Having the proper PPE is the same as having the right tools to do a job.



❖ A wide variety of PPE is needed for the many hazards at mining operations.