

**OREGON OCCUPATIONAL
SAFETY AND HEALTH STANDARDS**

Oregon Administrative Rules, Chapter 437

**DIVISION 3 (29 CFR 1926)
CONSTRUCTION**



CONSTRUCTION
Subdivision H
Materials Handling,
Storage, Use, and Disposal

Oregon Occupational Safety and Health Division (Oregon OSHA)
Department of Consumer and Business Services
Salem, Oregon 97301-3882

AO 4-2011

The Oregon Department of Consumer and Business Services adopted these rules pursuant to ORS 654.025(2).

The Secretary of State Designated OAR Chapter 437 as the "Oregon Occupational Safety and Health Code." Six general subject areas within this code are designated as "Divisions."

- **Division 1** General Administrative Rules
- **Division 2** General Occupational Safety and Health Rules
- **Division 3** Construction
- **Division 4** Agriculture
- **Division 5** Maritime Activities
- **Division 7** Forest Activities
- **Oregon Revised Statutes (ORS) 654** The Oregon Safe Employment Act (OSEAct)

Oregon-initiated rules in this division of the Oregon Occupational Safety and Health Code are numbered in a uniform system developed by the Secretary of State. This system does not number the rules in sequence (001, 002, 003, etc.). Omitted numbers may be assigned to new rules at the time of their adoption.

Oregon-initiated rules are arranged in the following Basic Codification Structure adopted by the Secretary of State for Oregon Administrative Rules (OAR):

Chapter	Division	Rule	Section	Subsection	Paragraphs
437	003	1760	(1)	(a)	(A)(i)(I)

The majority of Oregon OSHA codes are adopted by reference from the Code of Federal Regulations (CFR), and are arranged in the following basic federal numbering system:

Chapter	Division	Part	Subpart (Subdivision)	Section	Paragraphs
437	003	1926	M	.502	(a)

The terms "subdivision" and "subpart" are synonymous within OAR 437, Oregon Occupational Safety and Health Code.

To obtain an order form or copies of these codes, address:

**Department of Consumer & Business Services
Oregon Occupational Safety & Health Division (Oregon OSHA)
350 Winter St. NE, Room 430
Salem, OR 97301-3882**

Or call the Oregon OSHA Resource Library at 503-378-3272

The rules referenced in this division are available for viewing in the Office of the Secretary of State, Administrative Rules and Office Document Section, Oregon State Archives Building, Salem, Oregon 97310, or the Central Office, Oregon Occupational Safety and Health Division of the Department of Consumer and Business Services, Room 430, 350 Winter St. NE Salem, OR 97301-3882. Please visit our web site at: www.orosha.org

MATERIALS HANDLING, STORAGE, USE, AND DISPOSAL

H

TABLE OF CONTENTS

1926.250	General requirements for storage	H-1
1926.251	Rigging equipment for material handling.....	H-3
1926.252	Disposal of waste materials	H-21

OAR 437, DIVISION 3

CONSTRUCTION

SUBDIVISION H – MATERIALS HANDLING, STORAGE, USE, AND DISPOSAL

437-003-0001 Adoption by Reference. *In addition to, and not in lieu of, any other safety and health codes contained in OAR Chapter 437, the Department adopts by reference the following federal regulations printed as part of the Code of Federal Regulations, in the Federal Register:*

(5) Subdivision H – Materials Handling, Storage, Use, and Disposal.

(a) 29 CFR 1926.250 General requirements for storage, published 6/30/93, FR vol. 58, no. 124, p. 35173.

(b) 29 CFR 1926.251 Rigging equipment for material handling, published 6/8/11, FR vol. 74, no. 110, p. 33590.

(c) 29 CFR 1926.252 Disposal of waste materials, published 4/6/79, FR vol. 44, p. 20940.

These standards are available at the Oregon Occupational Safety and Health Division, Oregon Department of Consumer and Business Services, and the United States Government Printing Office.

Stat. Auth.: ORS 654.025(2) and 656.726(4).

Stats. Implemented: ORS 654.001 through 654.295.

Hist: APD Admin. Order 5-1989, f. 3/31/89, ef. 5/1/89 (temp).
APD Admin. Order 8-1989, f. 7/7/89, ef. 7/7/89 (perm).
APD Admin. Order 14-1989, f. 7/20/89, ef. 8/1/89 (temp).
APD Admin. Order 15-1989, f. 9/13/89, ef. 9/13/89 (perm).
APD Admin. Order 16-1989 (temp), f. 9/13/89, ef. 9/13/89.
OR-OSHA Admin. Order 2-1989, f. 10/17/89, ef. 10/17/89.
OR-OSHA Admin. Order 3-1990, f. 1/19/90, ef. 1/19/90 (temp).
OR-OSHA Admin. Order 7-1990, f. 3/2/90, ef. 3/2/90 (perm).
OR-OSHA Admin. Order 8-1990, f. 3/30/90, ef. 3/30/90.
OR-OSHA Admin. Order 13-1990, f. 6/28/90, ef. 8/1/90 (temp).
OR-OSHA Admin. Order 19-1990, f. 8/31/90, ef. 8/31/90 (perm).
OR-OSHA Admin. Order 27-1990, f. 12/12/90, ef. 2/1/91.
OR-OSHA Admin. Order 6-1991, f. 3/18/91, ef. 4/15/91.
OR-OSHA Admin. Order 7-1991, f. 4/25/91, ef. 4/25/91.
OR-OSHA Admin. Order 15-1991, f. 12/13/91, ef. 12/13/91.
OR-OSHA Admin. Order 16-1991, f. 12/16/91, ef. 1/1/92.
OR-OSHA Admin. Order 6-1992, f. 5/18/92, ef. 5/18/92.
OR-OSHA Admin. Order 11-1992, f. 10/9/92, ef. 10/9/92.
OR-OSHA Admin. Order 1-1993, f. 1/22/93, ef. 1/22/93.
OR-OSHA Admin. Order 16-1993, f. 11/1/93, ef. 11/1/93 (Lead).
OR-OSHA Admin. Order 1-1994, f. 4/27/94, ef. 4/27/94.
OR-OSHA Admin. Order 4-1994, f. 8/4/94, ef. 8/4/94 (HazCom).
OR-OSHA Admin. Order 6-1994, f. 9/30/94, ef. 9/30/94.
OR-OSHA Admin. Order 1-1995, f. 1/19/95, ef. 1/19/95 (DOT markings, placards & labels).
OR-OSHA Admin. Order 3-1995, f. 2/22/95, ef. 2/22/95 (Haz Waste).
OR-OSHA Admin. Order 4-1995, f. 3/29/95, ef. 3/29/95 (Asbestos).
OR-OSHA Admin. Order 5-1995, f. 4/6/95, ef. 4/6/95 (HazCom).
OR-OSHA Admin. Order 6-1995, f. 4/18/95, ef. 6/1/95 (Fall Protection).
OR-OSHA Admin. Order 8-1995, f. 8/25/95, ef. 8/25/95 (Asbestos).
OR-OSHA Admin. Order 5-1996, f. 11/29/96, ef. 11/29/96.
OR-OSHA Admin. Order 6-1996, f. 11/29/96, ef. 11/29/96.
OR-OSHA Admin. Order 2-1997, f. 3/12/97, ef. 3/12/97.
OR-OSHA Admin. Order 4-1997, f. 4/2/97, ef. 4/2/97.
OR-OSHA Admin. Order 6-1997, f. 5/2/97, ef. 5/2/97.
OR-OSHA Admin. Order 7-1997, f. 9/15/97, ef. 9/15/97 (Fall Protection).
OR-OSHA Admin. Order 8-1997, f. 11/14/97, e. 11/14/97 (Methylene Chloride).
OR-OSHA Admin. Order 1-1998, f. 2/13/98, e. 2/13/98 (Methylene Chloride).
OR-OSHA Admin. Order 3-1998, f. 7/7/98, ef. 7/7/98 (Respiratory Protection).
OR-OSHA Admin. Order 6-1998, f. 10/15/98, ef. 10/15/98 (Slings 3/H).
OR-OSHA Admin. Order 7-1998, f. 12/28/98, ef. 12/28/98 (Asbestos).

H

MATERIALS HANDLING, STORAGE, USE, AND DISPOSAL

Oregon Administrative Rules
Oregon Occupational Safety
and Health Division

OR-OSHA Admin. Order 1-1999, f. 3/22/99, e. 3/22/99 (Methylene Chloride).
OR-OSHA Admin. Order 4-1999, f. 4/30/99, ef. 4/30/99.
OR-OSHA Admin. Order 6-1999, f. 5/26/99, ef. 5/26/99.
OR-OSHA Admin. Order 3-2000, f. 2/8/00, ef. 2/8/00.
OR-OSHA Admin. Order 3-2001, f. 2/5/01, ef. 2/5/01 (Fall Protection/Oregon Exceptions).
OR-OSHA Admin. Order 3-2002, f. 4/15/02, ef. 4/18/02 (Steel Erection).
OR-OSHA Admin. Order 5-2002, f. 6/28/02, ef. 10/1/03 (GFCI 3/K).
OR-OSHA Admin. Order 6-2002, f. 7/19/02, ef. 7/19/02 (Fall Protection/Steel Erection).
OR-OSHA Admin. Order 1-2003, f. 1/30/03, ef. 4/30/03 (3/Q Masonry Wall Bracing).
OR-OSHA Admin. Order 2-2003, f. 1/30/03, ef. 1/30/03 (3/G).
OR-OSHA Admin. Order 7-2003, f. 12/5/03, ef. 12/5/03 (3/O).
OR-OSHA Admin. Order 8-2003, f. 12/30/03, ef. 1/1/04 (3/R).
OR-OSHA Admin. Order 1-2005, f. 4/12/05, ef. 4/12/05 (3/D and 3/Z).
OR-OSHA Admin. Order 2-2006, f. 4/28/06, ef. 4/28/06 (3/R).
OR-OSHA Admin. Order 4-2006, f. 7/24/06, ef. 7/24/06.
OR-OSHA Admin. Order 5-2006, f. 8/7/06, ef. 1/1/07.
OR-OSHA Admin. Order 6-2006, f. 8/30/06, ef. 8/30/06.
OR-OSHA Admin. Order 10-2006, f. 11/30/06, ef. 11/30/06.
OR-OSHA Admin. Order 6-2007, f. 9/26/07, ef. 9/26/07 (3/O).
OR-OSHA Admin. Order 5-2008, f. 5/1/08, ef. 5/15/08 (PPE).
OR-OSHA Admin. Order 5-2009, f. 5/29/09, ef. 5/29/09.
OR-OSHA Admin. Order 3-2010, f. 6/10/10, ef. 6/15/10.
OR-OSHA Admin. Order 1-2011, f. 2/9/11, ef. 2/9/11.
OR-OSHA Admin. Order 4-2011, f. 12/8/11, ef. 12/8/11.
OR-OSHA Admin. Order 5-2011, f. 12/8/11, ef. 7/1/12.
OR-OSHA Admin. Order 1-2012, f. 4/10/12, ef. 4/10/12.
OR-OSHA Admin. Order 5-2012, f. 9/25/12, ef. 9/25/12.
OR-OSHA Admin. Order 1-2013, f. 2/14/13, ef. 2/14/13.
OR-OSHA Admin. Order 2-2013, f. 2/15/13, ef. 4/1/13.
OR-OSHA Admin. Order 4-2013, f. 7/19/13, ef. 7/19/13.
OR-OSHA Admin. Order 5-2013, f. 9/13/13, ef. 9/13/13.
OR-OSHA Admin. Order 6-2013, f. 10/9/13, ef. 10/9/13.
OR-OSHA Admin. Order 7-2013, f. 12/12/13, ef. 12/12/13.
OR-OSHA Admin. Order 6-2014, f. 10/28/14, ef. 5/1/15.
OR-OSHA Admin. Order 7-2014, f. 11/7/14, ef. 11/9/14.

GENERAL REQUIREMENTS FOR STORAGE

H

SUBDIVISION H

MATERIALS HANDLING, STORAGE, USE, AND DISPOSAL

Authority: 40 U.S.C. 3701; 29 U.S.C. 653, 655, 657; and Secretary of Labor's Order No. 12-71 (36 FR 8754), 8-76 (41 FR 25059), 9-83 (48 FR 35736), 1-90 (55 FR 9033), or 4-2010 (75 FR 55355), as applicable. Section 1926.250 also issued under 29 CFR 1911.

§1926.250 General Requirements for Storage.

(a) General.

- (1)** All materials stored in tiers shall be stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling or collapse.
- (2)** Maximum safe load limits of floors within buildings and structures, in pounds per square foot, shall be conspicuously posted in all storage areas, except for floor or slab on grade. Maximum safe loads shall not be exceeded.
- (3)** Aisles and passageways shall be kept clear to provide for the free and safe movement of material handling equipment or employees. Such areas shall be kept in good repair.
- (4)** When a difference in road or working levels exist, means such as ramps, blocking, or grading shall be used to ensure the safe movement of vehicles between the two levels.

(b) Material storage.

- (1)** Material stored inside buildings under construction shall not be placed within 6 feet of any hoistway or inside floor openings, nor within 10 feet of an exterior wall which does not extend above the top of the material stored.
- (2)** Each employee required to work on stored material in silos, hoppers, tanks, and similar storage areas shall be equipped with personal fall arrest equipment meeting the requirements of Subpart M of this part.
- (3)** Noncompatible materials shall be segregated in storage.
- (4)** Bagged materials shall be stacked by stepping back the layers and cross-keying the bags at least every 10 bags high.
- (5)** Materials shall not be stored on scaffolds or runways in excess of supplies needed for immediate operations.

(6) Brick stacks shall not be more than 7 feet in height. When a loose brick stack reaches a height of 4 feet, it shall be tapered back 2 inches in every foot of height above the 4-foot level.

(7) When masonry blocks are stacked higher than 6 feet, the stack shall be tapered back one-half block per tier above the 6-foot level.

(8) Lumber:

(i) Used lumber shall have all nails withdrawn before stacking.

(ii) Lumber shall be stacked on level and solidly supported sills.

(iii) Lumber shall be so stacked as to be stable and self-supporting.

(iv) Lumber piles shall not exceed 20 feet in height provided that lumber to be handled manually shall not be stacked more than 16 feet high.

(9) Structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked, shall be stacked and blocked so as to prevent spreading or tilting.

(c) **Housekeeping.** Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.

(d) **“Dockboards (bridge plates).”**

(1) Portable and powered dockboards shall be strong enough to carry the load imposed on them.

(2) Portable dockboards shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping.

(3) Handholds, or other effective means, shall be provided on portable dockboards to permit safe handling.

(4) Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position.

(The information collection requirements contained in paragraph (a)(2) were approved by the Office of Management and Budget under control number 1218-0003.)

(44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 49 FR 18295, Apr. 30, 1984)

Stat. Auth.: ORS 654.025(2) and 656.726(3).

Stats. Implemented: ORS 654.001 through 654.295.

Hist: APD Admin. Order 8-1989, f. 7/7/89, ef. 7/7/89.

OR-OSHA Admin. Order 6-1995, f. 4/18/95, ef. 6/1/95.

OR-OSHA Admin. Order 6-1998, f. 10/15/98, ef. 10/15/98.

OR-OSHA Admin. Order 3-2000, f. 2/8/00, ef. 2/8/00.

§1926.251 Rigging Equipment for Material Handling.

(a) General.

(1) Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service.

(2) Employers must ensure that rigging equipment:

(i) Has permanently affixed and legible identification markings as prescribed by the manufacturer that indicate the recommended safe working load;

(ii) Not be loaded in excess of its recommended safe working load as prescribed on the identification markings by the manufacturer; and

(iii) Not be used without affixed, legible identification markings, required by paragraph (a)(2)(i) of this section.

(3) Rigging equipment, when not in use, shall be removed from the immediate work area so as not to present a hazard to employees.

(4) Special custom design grabs, hooks, clamps, or other lifting accessories, for such units as modular panels, prefabricated structures and similar materials, shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125 percent of their rated load.

(5) **Scope.** This section applies to slings used in conjunction with other material handling equipment for the movement of material by hoisting, in employments covered by this part. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene).

(6) **Inspections.** Each day before being used, the sling and all fastenings and attachments shall be inspected for damage or defects by a competent person designated by the employer. Additional inspections shall be performed during sling use, where service conditions warrant. Damaged or defective slings shall be immediately removed from service.

(b) Alloy steel chains.

(1) Welded alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer.

(2) Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, shall have a rated capacity at least equal to that of the chain.

(3) Job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, etc., or other such attachments, shall not be used.

(4) Employers must not use alloy steel-chain slings with loads in excess of the rated capacities (i.e., working load limits) indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer.

(5) Whenever wear at any point of any chain link exceeds that shown in Table H-2, the assembly shall be removed from service.

(6) Inspections.

(i) In addition to the inspection required by other paragraphs of this section, a thorough periodic inspection of alloy steel chain slings in use shall be made on a regular basis, to be determined on the basis of (A) frequency of sling use; (B) severity of service conditions; (C) nature of lifts being made; and (D) experience gained on the service life of slings used in similar circumstances. Such inspections shall in no event be at intervals greater than once every 12 months.

(ii) The employer shall make and maintain a record of the most recent month in which each alloy steel chain sling was thoroughly inspected, and shall make such record available for examination.

(c) Wire rope.

(1) Employers must not use improved plow-steel wire rope and wire-rope slings with loads in excess of the rated capacities (i.e., working load limits) indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer.

(2) Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

(3) Wire rope shall not be secured by knots, except on haul back lines on scrapers.

(4) The following limitations shall apply to the use of wire rope:

(i) An eye splice made in any wire rope shall have not less than three full tucks. However, this requirement shall not operate to preclude the use of another form of splice or connection which can be shown to be as efficient and which is not otherwise prohibited.

(ii) Except for eye splices in the ends of wires and for endless rope slings, each wire rope used in hoisting or lowering, or in pulling loads, shall consist of one continuous piece without knot or splice.

(iii) Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire rope clips or knots.

(iv) Wire rope shall not be used if, in any length of eight diameters, the total number of visible broken wires exceeds 10 percent of the total number of wires, or if the rope shows other signs of excessive wear, corrosion, or defect.

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

- (5) When U-bolt wire rope clips are used to form eyes, Table H-20 shall be used to determine the number and spacing of clips.
- (i) When used for eye splices, the U-bolt shall be applied so that the “U” section is in contact with the dead end of the rope.
- (6) Slings shall not be shortened with knots or bolts or other makeshift devices.
- (7) Sling legs shall not be kinked.
- (8) Slings used in a basket hitch shall have the loads balanced to prevent slippage.
- (9) Slings shall be padded or protected from the sharp edges of their loads.
- (10) Hands or fingers shall not be placed between the sling and its 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.
- (13) Minimum sling lengths.**
- (i) Cable laid and 6 X 19 and 6 X 37 slings shall have minimum clear length of wire rope 10 times the component rope diameter between splices, sleeves or end fittings.
 - (ii) Braided slings shall have a minimum clear length of wire rope 40 times the component rope diameter between the loops or end fittings.
 - (iii) Cable laid grommets, strand laid grommets and endless slings shall have a minimum circumferential length of 96 times their body diameter.
- (14) Safe operating temperatures.** Fiber core wire rope slings of all grades shall be permanently removed from service if they are exposed to temperatures in excess of 200° F (93.33° C). When nonfiber core wire rope slings of any grade are used at temperatures above 400° F (204.44° C) or below minus 60° F (15.55° C), recommendations of the sling manufacturer regarding use at that temperature shall be followed.
- (15) End attachments.**
- (i) Welding of end attachments, except covers to thimbles, shall be performed prior to the assembly of the sling.
 - (ii) All welded end attachments shall not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer shall retain a certificate of proof test, and make it available for examination.
- (16) Wire rope slings shall have permanently affixed, legible identification markings stating size, rated capacity for the type(s) of hitch(es) used and the angle upon which it is based, and the number of legs if more than one.

(d) Natural rope, and synthetic fiber.

(1) Employers must not use natural- and synthetic-fiber rope slings with loads in excess of the rated capacities (i.e., working load limits) indicated on the sling by permanently affixed and legible identification markings prescribed by the manufacturer.

(2) All splices in rope slings provided by the employer shall be made in accordance with fiber rope manufacturers recommendations.

(i) In manila rope, eye splices shall contain at least three full tucks, and short splices shall contain at least six full tucks (three on each side of the centerline of the splice).

(ii) In layed synthetic fiber rope, eye splices shall contain at least four full tucks, and short splices shall contain at least eight full tucks (four on each side of the centerline of the splice).

(iii) Strand end tails shall not be trimmed short (flush with the surface of the rope) immediately adjacent to the full tucks. This precaution applies to both eye and short splices and all types of fiber rope. For fiber ropes under 1-inch diameter, the tails shall project at least six rope diameters beyond the last full tuck. For fiber ropes 1-inch diameter and larger, the tails shall project at least 6 inches beyond the last full tuck. In applications where the projecting tails may be objectionable, the tails shall be tapered and spliced into the body of the rope using at least two additional tucks (which will require a tail length of approximately six rope diameters beyond the last full tuck).

(iv) For all eye splices, the eye shall be sufficiently large to provide an included angle of not greater than 60° at the splice when the eye is placed over the load or support.

(v) Knots shall not be used in lieu of splices.

(3) Safe operating temperatures. Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range from minus 20° F (-28.88° C) to plus 180° F (82.2° C) without decreasing the working load limit. For operations outside this temperature range and for wet frozen slings, the sling manufacturer's recommendations shall be followed.

(4) Splicing. Spliced fiber rope slings shall not be used unless they have been spliced in accordance with the following minimum requirements and in accordance with any additional recommendations of the manufacturer:

(i) In manila rope, eye splices shall consist of at least three full tucks, and short splices shall consist of at least six full tucks, three on each side of the splice center line.

(ii) In synthetic fiber rope, eye splices shall consist of at least four full tucks, and short splices shall consist of at least eight full tucks, four on each side of the center line.

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

(iii) Strand end tails shall not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope under 1 inch (2.54 cm) in diameter, the tail shall project at least six rope diameters beyond the last full tuck. For fiber rope 1 inch (2.54 cm) in diameter and larger, the tail shall project at least 6 inches (15.24 cm) beyond the last full tuck. Where a projecting tail interferes with the use of the sling, the tail shall be tapered and spliced into the body of the rope using at least two additional tucks (which will require a tail length of approximately six rope diameters beyond the last full tuck).

(iv) Fiber rope slings shall have a minimum clear length of rope between eye splices equal to 10 times the rope diameter.

(v) Knots shall not be used in lieu of splices.

(vi) Clamps not designed specifically for fiber ropes shall not be used for splicing.

(vii) For all eye splices, the eye shall be of such size to provide an included angle of not greater than 60° at the splice when the eye is placed over the load or support.

(5) End attachments. Fiber rope slings shall not be used if end attachments in contact with the rope have sharp edges or projections.

(6) Removal from service. Natural and synthetic fiber rope slings shall be immediately removed from service if any of the following conditions are present:

(i) Abnormal wear.

(ii) Powdered fiber between strands.

(iii) Broken or cut fibers.

(iv) Variations in the size or roundness of strands.

(v) Discoloration or rotting.

(vi) Distortion of hardware in the sling.

(7) Employers must use natural- and synthetic-fiber rope slings that have permanently affixed and legible identification markings that state the rated capacity for the type(s) of hitch(es) used and the angle upon which it is based, type of fiber material, and the number of legs if more than one.

(e) Synthetic webbing (nylon, polyester, and polypropylene).

(1) The employer shall have each synthetic web sling marked or coded to show:

(i) Name or trademark of manufacturer.

(ii) Rated capacities for the type of hitch.

(iii) Type of material.

(2) Rated capacity shall not be exceeded.

(3) **Webbing.** Synthetic webbing shall be of uniform thickness and width and selvage edges shall not be split from the webbing's width.

(4) **Fittings.** Fittings shall be:

(i) Of a minimum breaking strength equal to that of the sling; and

(ii) Free of all sharp edges that could in any way damage the webbing.

(5) **Attachment of end fittings to webbing and formation of eyes.** Stitching shall be the only method used to attach end fittings to webbing and to form eyes. The thread shall be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.

(6) **Environmental conditions.** When synthetic web slings are used, the following precautions shall be taken:

(i) Nylon web slings shall not be used where fumes, vapors, sprays, mists or liquids of acids or phenolics are present.

(ii) Polyester and polypropylene web slings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

(iii) Web slings with aluminum fittings shall not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

(7) **Safe operating temperatures.** Synthetic web slings of polyester and nylon shall not be used at temperatures in excess of 180° F (82.2° C). Polypropylene web slings shall not be used at temperatures in excess of 200° F (93.33° C).

(8) **Removal from service.** Synthetic web slings shall be immediately removed from service if any of the following conditions are present:

(i) Acid or caustic burns;

(ii) Melting or charring of any part of the sling surface;

(iii) Snags, punctures, tears or cuts;

(iv) Broken or worn stitches; or

(v) Distortion of fittings.

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

(f) Shackles and hooks.

(1) Employers must not use shackles with loads in excess of the rated capacities (i.e., working load limits) indicated on the shackle by permanently affixed and legible identification markings prescribed by the manufacturer.

(2) The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use. The employer shall maintain a record of the dates and results of such tests.

Table H-1 – Rated Capacity (Working Load Limit), for Alloy Steel Chain Slings¹
Rated Capacity (Working Load Limit), Pounds
[Horizontal angles shown in parentheses] (2)

Chain size (inches)	Single branch sling – 90° loading	Double sling vertical angle (1)			Triple and quadruple sling vertical angle (1)		
		30° (60°)	45° (45°)	60° (30°)	30° (60°)	45° (45°)	60° (30°)
1/4	3,250	5,560	4,550	3,250	8,400	6,800	4,900
3/8	6,600	11,400	9,300	6,600	17,000	14,000	9,900
1/2	11,250	19,500	15,900	11,250	29,000	24,000	17,000
5/8	16,500	28,500	23,300	16,500	43,000	35,000	24,500
3/4	23,000	39,800	32,500	23,000	59,500	48,500	34,500
7/8	28,750	49,800	40,600	28,750	74,500	61,000	43,000
1	38,750	67,100	54,800	38,750	101,000	82,000	58,000
1-1/8	44,500	77,000	63,000	44,500	115,500	94,500	66,500
1-1/4	57,500	99,500	81,000	57,500	149,000	121,500	86,000
1-3/8	67,000	116,000	94,000	67,000	174,000	141,000	100,500
1-1/2	80,000	138,000	112,500	80,000	207,000	169,000	119,500
1-3/4	100,000	172,000	140,000	100,000	258,000	210,000	150,000

¹ Other grades of proof tested steel chain include Proof Coil, BBB Coil and Hi-Test Chain. These grades are not recommended for overhead lifting and therefore are not covered by this code.

(1) Rating of multileg slings adjusted for angle of loading measured as the included angle between the inclined leg and the vertical.

(2) Rating of multileg slings adjusted for angle of loading between the inclined leg and the horizontal plane of the load.

Table H-2 – Maximum Allowable Wear at any Point of Link

Chain size (inches)	Maximum allowable wear (inch)	Chain size (inches)	Maximum allowable wear (inch)
1/4	3/64	1	3/16
3/8	5/64	1 1/8	7/32
1/2	7/64	1 1/4	1/4
5/8	9/64	1 3/8	9/32
3/4	5/32	1 1/2	5/16
7/8	11/64	1 3/4	11/32

H

RIGGING EQUIPMENT FOR MATERIAL HANDLING

Oregon Administrative Rules
Oregon Occupational Safety
and Health Division

Table H-3 – Rated Capacities for Single Leg Slings
6x19 and 6x37 Classification Improved Plow Steel Grade Rope with Fiber Core (FC)

Rope		Rated capacities, tons (2,000 lb.)								
Dia. (inches)	Constr.	Vertical			Choker			Vertical basket ¹		
		HT	MS	S	HT	MS	S	HT	MS	S
1/4	6x19	0.49	0.51	0.55	0.37	0.38	0.41	0.99	1.0	1.1
5/16	6x19	0.76	0.79	0.85	0.57	0.59	0.64	1.5	1.6	1.7
3/8	6x19	1.1	1.1	1.2	0.80	0.85	0.91	2.1	2.2	2.4
7/16	6x19	1.4	1.5	1.6	1.1	1.1	1.2	2.9	3.0	3.3
1/2	6x19	1.8	2.0	2.1	1.4	1.5	1.6	3.7		4.3
9/16	6x19	2.3	2.5	2.7	1.7	1.9	2.0	4.6	3.9	5.4
5/8	6x19	2.8	3.1	3.3	2.1	2.3	2.5	5.6	5.0	6.7
3/4	6x19	3.9	4.4	4.8	2.9	3.3	3.6	7.8	6.2	9.5
7/8	6x19	5.1	5.9	6.4	3.9	4.5	4.8	10.0	8.8	13.0
1	6x19	6.7	7.7	8.4	5.0	5.8	6.3	13.0	12.0	17.0
1 1/8	6x19	8.4	9.5	10.0	6.3	7.1	7.9	17.0	15.0	21.0
1 1/4	6x37	9.8	11.0	12.0	7.4	8.3	9.2	20.0	19.0	25.0
1 3/8	6x37	12.0	13.0	15.0	8.9	10.0	11.0	24.0	22.0	30.0
1 1/2	6x37	14.0	16.0	17.0	10.0	12.0	13.0	28.0	27.0	35.0
1 5/8	6x37	16.0	18.0	21.0	12.0	14.0	15.0	33.0	32.0	41.0
1 3/4	6x37	19.0	21.0	24.0	14.0	16.0	18.0	38.0	37.0	48.0
2	6x37	25.0	28.0	31.0	18.0	21.0	23.0	49.0	43.0	62.0
								55.0		

¹ These values only apply when the D/d ratio for HT slings is 10 or greater, and for MS and S Slings is 20 or greater where:
D = Diameter of curvature around which the body of the sling is bent. d = Diameter of rope.
HT = Hand Tucked Splice and Hidden Tuck Splice. For hidden tuck splice (IWRC) use values in HT columns.
MS = Mechanical Splice.
S = Swaged or Zinc Poured Socket.

Table H-4 – Rated Capacities for Single Leg Slings
6x19 and 6x37 Classification Improved Plow Steel Grade Rope with Independent Wire Core (IWRC)

Rope		Rated capacities, tons (2,000 lb.)								
Dia. (inches)	Constr.	Vertical			Choker			Vertical basket ¹		
		HT	MS	S	HT	MS	S	HT	MS	S
1/4	6x19	0.53	0.56	0.59	0.40	0.42	0.44	1.0	1.1	1.2
5/16	6x19	0.81	0.87	0.92	0.61	0.65	0.69	1.6	1.7	1.8
3/8	6x19	1.1	1.2	1.3	0.86	0.93	0.98	2.3	2.5	2.6
7/16	6x19	1.5	1.7	1.8	1.2	1.3	1.3	3.1	3.4	3.5
1/2	6x19	2.0	2.2	2.3	1.5	1.6	1.7	3.9		4.6
9/16	6x19	2.5	2.7	2.9	1.8	2.1	2.2	4.9		5.8
5/8	6x19	3.0	3.4	3.6	2.2	2.5	2.7	6.0	5.5	7.2
3/4	6x19	4.2	4.9	5.1	3.1	3.6	3.8	8.4	6.8	10.0
7/8	6x19	5.5	6.6	6.9	4.1	4.9	5.2	11.0	9.7	14.0
1	6x19	7.2	8.5	9.0	5.4	6.4	6.7	14.0	13.0	18.0
1 1/8	6x19	9.0	10.0	11.0	6.8	7.8	8.5	18.0	17.0	23.0
1 1/4	6x37	10.0	12.0	13.0	7.9	9.2	9.9	21.0	21.0	26.0
1 3/8	6x37	13.0	15.0	16.0	9.6	11.0	12.0	25.0	24.0	32.0
1 1/2	6x37	15.0	17.0	19.0	11.0	13.0	14.0	30.0	29.0	38.0
1 5/8	6x37	18.0	20.0	22.0	13.0	15.0	17.0	35.0	35.0	44.0
1 3/4	6x37	20.0	24.0	26.0	15.0	18.0	19.0	41.0	41.0	51.0
2	6x37	26.0	30.0	33.0	20.0	23.0	25.0	53.0	47.0	66.0
								61.0		

¹ These values only apply when the D/d ratio for HT slings is 10 or greater, and for MS and S Slings is 20 or greater where:
D = Diameter of curvature around which the body of the sling is bent. d = Diameter of rope.
HT = Hand Tucked Splice: For hidden tuck splice (IWRC) use Table H-3 values in HT column.
MS = Mechanical Splice.
S = Swaged or Zinc Poured Socket.

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

Table H-5 – Rated Capacities for Single Leg Slings
Cable Laid Rope – Mechanical Splice Only
7x7x7 and 7x7x19 Construction Galvanized Aircraft Grade Rope
7x6x19 IWRC Construction Improved Plow Steel Grade Rope

Rope		Rated capacities, tons (2,000 lb.)		
Dia. (inches)	Constr.	Vertical	Choker	Vertical basket ¹
1/4	7x7x7	0.50	0.38	1.0
3/8	7x7x7	1.1	0.81	2.2
1/2	7x7x7	1.8	1.4	3.7
5/8	7x7x7	2.8	2.1	5.5
3/4	7x7x7	3.8	2.9	7.6
5/8	7x7x19	2.9	2.2	5.8
3/4	7x7x19	4.1	3.0	8.1
7/8	7x7x19	5.4	4.0	11.0
1	7x7x19	6.9	5.1	14.0
1 1/8	7x7x19	8.2	6.2	16.0
1 1/4	7x7x19	9.9	7.4	20.0
3/4	² 7x6x19	3.8	2.8	7.6
7/8	² 7x6x19	5.0	3.8	10.0
1	² 7x6x19	6.4	4.8	13.0
1 1/8	² 7x6x19	7.7	5.8	15.0
1 1/4	² 7x6x19	9.2	6.9	18.0
1 5/16	² 7x6x19	10.0	7.5	20.0
1 3/8	² 7x6x19	11.0	8.2	22.0
1 1/2	² 7x6x19	13.0	9.6	26.0

¹ These values only apply when the D/d ratio is 10 or greater where: D = Diameter of curvature around which the body of the sling is bent.

d = Diameter of rope.

² IWRC.

Table H-6 – Rated Capacities for Single Leg Slings
8-Part and 6-Part Braided Rope
6x7 and 6x19 Construction Improved Plow Steel Grade Rope
7x7 Construction Galvanized Aircraft Grade Rope

Component ropes		Rated capacities, tons (2,000 lb.)					
Diameter (inches)	Constr.	Vertical		Choker		Basket vertical to 30° ¹	
		8-Part	6-Part	8-Part	6-Part	8-Part	6-Part
3/32	6x7	0.42	0.32	0.32	0.24	0.74	0.55
1/8	6x7	0.76	0.57	0.57	0.42	1.3	0.98
3/16	6x7	1.7	1.3	1.3	0.94	2.9	2.2
3/32	7x7	0.51	0.39	0.38	0.29	0.89	0.67
1/8	7x7	0.95	0.71	0.71	0.53	1.6	1.2
3/16	7x7	2.1	1.5	1.5	1.2	3.6	2.7
3/16	6x19	1.7	1.3	1.3	0.98	3.0	2.2
1/4	6x19	3.1	2.3	2.3	1.7	5.3	4.0
5/16	6x19	4.8	3.6	3.6	2.7	8.3	6.2
3/8	6x19	6.8	5.1	5.1	3.8	12.0	8.9
7/16	6x19	9.3	6.9	6.9	5.2	16.0	12.0
1/2	6x19	12.0	9.0	9.0	6.7	21.0	15.0
9/16	6x19	15.0	11.0	11.0	8.5	26.0	20.0
5/8	6x19	19.0	14.0	14.0	10.0	32.0	24.0
3/4	6x19	27.0	20.0	20.0	15.0	46.0	35.0
7/8	6x19	36.0	27.0	27.0	20.0	62.0	47.0
1	6x19	47.0	35.0	35.0	26.0	81.0	61.0

¹ These values only apply when the D/d ratio is 20 or greater where: D = Diameter of curvature around which the body of the sling is bent.

d = Diameter of component rope.

H

RIGGING EQUIPMENT FOR MATERIAL HANDLING

Oregon Administrative Rules
Oregon Occupational Safety
and Health Division

**Table H-7 – Rated Capacities for 2-Leg and 3-Leg Bridle Slings
6x19 and 6x37 Classification Improved Plow Steel Grade Rope with Fiber Core (FC)**

Rope		Rated capacities, tons (2,000 lb.)											
Dia. (inches)	Constr.	2-leg bridle slings						3-leg bridle slings					
		30° ¹ (60°) ²		45° angle		60° ¹ (30°) ²		30° ¹ (60°) ²		45° angle		60° ¹ (30°) ²	
		HT	MS	HT	MS	HT	MS	HT	MS	HT	MS	HT	MS
1/4	6x19	0.85	0.88	0.70	0.72	0.49	0.51	1.3	1.3	1.0	1.1	0.74	0.7
5/16	6x19	1.3	1.4	1.1	1.1	0.76	0.79	2.0	2.0	1.6	1.7	1.1	1.2
3/8	6x19	1.8	1.9	1.5	1.6	1.1	1.1	2.8	2.9	2.3	2.4	1.6	1.7
7/16	6x19	2.5	2.6	2.0	2.2	1.4	1.5	3.7	4.0	3.0	3.2	2.1	2.3
1/2	6x19	3.2	3.4	2.6	2.8	1.8	2.0	4.8	5.1	3.9	4.2	2.8	3.0
9/16	6x19	4.0	4.3	3.2	3.5	2.3	2.5	6.0	6.5	4.9	5.3	3.4	3.7
5/8	6x19	4.8	5.3	4.0	4.4	2.8	3.1	7.3	8.0	5.9	6.5	4.2	4.6
3/4	6x19	6.8	7.6	5.5	6.2	3.9	4.4	10.0	11.0	8.3	9.3	5.8	6.6
7/8	6x19	8.9	10.0	7.3	8.4	5.1	5.9	13.0	15.0	11.0	13.0	7.7	8.9
1	6x19	11.0	13.0	9.4	11.0	6.7	7.7	17.0	20.0	14.0	16.0	10.0	11.0
1 1/8	6x19	14.0	16.0	12.0	13.0	8.4	9.5	22.0	24.0	18.0	20.0	13.0	14.0
1 1/4	6x37	17.0	19.0	14.0	16.0	9.8	11.0	25.0	29.0	21.0	23.0	15.0	17.0
1 3/8	6x37	20.0	23.0	17.0	19.0	12.0	13.0	31.0	35.0	25.0	28.0	18.0	20.0
1 1/2	6x37	24.0	27.0	20.0	22.0	14.0	16.0	36.0	41.0	30.0	33.0	21.0	24.0
1 5/8	6x37	28.0	32.0	23.0	26.0	16.0	18.0	43.0	48.0	35.0	39.0	25.0	28.0
1 3/4	6x37	33.0	37.0	27.0	30.0	19.0	21.0	49.0	56.0	40.0	45.0	28.0	32.0
2	6x37	43.0	48.0	35.0	39.0	25.0	28.0	64.0	72.0	52.0	59.0	37.0	41.0

HT = Hand Tucked Splice.
MS = Mechanical Splice.

¹ Vertical angles.
² Horizontal angles.

**Table H-8 – Rated Capacities for 2-Leg and 3-Leg Bridle Slings
6x19 and 6x37 Classification Improved Plow Steel Grade Rope with Independent Wire Core (IWRC)**

Rope		Rated capacities, tons (2,000 lb.)											
Dia. (inches)	Constr.	2-leg bridle slings						3-leg bridle slings					
		30° ¹ (60°) ²		45° angle		60° ¹ (30°) ²		30° ¹ (60°) ²		45° angle		60° ¹ (30°) ²	
		HT	MS	HT	MS	HT	MS	HT	MS	HT	MS	HT	MS
1/4	6x19	0.92	0.97	0.75	0.79	0.53	0.56	1.4	1.4	1.1	1.2	0.79	0.84
5/16	6x19	1.4	1.5	1.1	1.2	1.81	0.87	2.1	2.3	1.7	1.8	1.2	1.3
3/8	6x19	2.0	2.1	1.6	1.8	1.1	1.2	3.0	3.2	2.4	2.6	1.7	1.9
7/16	6x19	2.7	2.9	2.2	2.4	1.5	1.7	4.0	4.4	3.3	3.6	2.3	2.5
1/2	6x19	3.4	3.8	2.8	3.1	2.0	2.2	5.1	5.7	4.2	4.6	3.0	3.3
9/16	6x19	4.3	4.8	3.5	3.9	2.5	2.7	6.4	7.1	5.2	5.8	3.7	4.1
5/8	6x19	5.2	5.9	4.2	4.8	3.0	3.4	7.8	8.8	6.4	7.2	4.5	5.1
3/4	6x19	7.3	8.4	5.9	6.9	4.2	4.9	11.0	13.0	8.9	10.0	6.3	7.3
7/8	6x19	9.6	11.0	7.8	9.3	5.5	6.6	14.0	17.0	12.0	14.0	8.3	9.9
1	6x19	12.0	15.0	10.0	12.0	7.2	8.5	19.0	22.0	15.0	18.0	11.0	13.0
1 1/8	6x19	16.0	18.0	13.0	15.0	9.0	10.0	23.0	27.0	19.0	22.0	13.0	16.0
1 1/4	6x37	18.0	21.0	15.0	17.0	10.0	12.0	27.0	32.0	22.0	26.0	16.0	18.0
1 3/8	6x37	22.0	25.0	18.0	21.0	13.0	15.0	33.0	38.0	27.0	31.0	19.0	22.0
1 1/2	6x37	26.0	30.0	21.0	25.0	15.0	17.0	39.0	45.0	32.0	37.0	23.0	26.0
1 5/8	6x37	31.0	35.0	25.0	29.0	18.0	20.0	46.0	53.0	38.0	43.0	27.0	31.0
1 3/4	6x37	35.0	41.0	29.0	33.0	20.0	24.0	53.0	61.0	43.0	50.0	31.0	35.0
2	6x37	46.0	53.0	37.0	43.0	26.0	30.0	68.0	79.0	56.0	65.0	40.0	46.0

HT = Hand Tucked Splice.
MS = Mechanical Splice.

¹ Vertical angles.
² Horizontal angles.

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

**Table H-9 – Rated Capacities for 2-Leg and 3-Leg Bridle Slings
Cable Laid Rope – Mechanical Splice Only
7x7x7 and 7x7x19 Construction Galvanized Aircraft Grade Rope
7x6x19 IWRC Construction Improved Plow Steel Grade Rope**

Rope		Rated capacities, tons (2,000 lb.)					
Dia. (inches)	Constr.	2-leg bridle sling			3-leg bridle sling		
		30° ¹ (60°) ²	45° angle	60° ¹ (30°) ²	30° ¹ (60°) ²	45° angle	60° ¹ (30°) ²
1/4	7x7x7	0.87	0.71	0.50	1.3	1.1	0.75
3/8	7x7x7	1.9	1.5	1.1	2.8	2.3	1.6
1/2	7x7x7	3.2	2.6	1.8	4.8	3.9	2.8
5/8	7x7x7	4.8	3.9	2.8	7.2	5.9	4.2
3/4	7x7x7	6.6	5.4	3.8	9.9	8.1	5.7
5/8	7x6x19	5.0	4.1	2.9	7.5	6.1	4.3
3/4	7x6x19	7.0	5.7	4.1	10.0	8.6	6.1
7/8	7x6x19	9.3	7.6	5.4	14.0	11.0	8.1
1	7x6x19	12.0	9.7	6.9	18.0	14.0	10.0
1 1/8	7x6x19	14.0	12.0	8.2	21.0	17.0	12.0
1 1/4	7x6x19	17.0	14.0	9.9	26.0	21.0	15.0
3/4	7x6x19 IWRC	6.6	5.4	3.8	9.9	8.0	5.7
7/8	7x6x19 IWRC	8.7	7.1	5.0	13.0	11.0	7.5
1	7x6x19 IWRC	11.0	9.0	6.4	17.0	13.0	9.6
1 1/8	7x6x19 IWRC	13.0	11.0	7.7	20.0	16.0	11.0
1 1/4	7x6x19 IWRC	16.0	13.0	9.2	24.0	20.0	14.0
1 5/16	7x6x19 IWRC	17.0	14.0	10.0	26.0	21.0	15.0
1 3/8	7x6x19 IWRC	19.0	15.0	11.0	28.0	23.0	16.0
1 1/2	7x6x19 IWRC	22.0	18.0	13.0	33.0	27.0	19.0

¹ Vertical angles.

² Horizontal angles.

**Table H-10 – Rated Capacities for 2-Leg and 3-Leg Bridle Slings
8-Part and 6-Part Braided Rope
6x7 and 6x19 Classification Improved Plow Steel Grade Rope
7x7 Construction Galvanized Aircraft Grade Rope**

Rope		Rated capacities, tons (2,000 lb.)											
Dia. (inches)	Constr.	2-leg bridle slings						3-leg bridle slings					
		30° ¹ (60°) ²		45° angle		60° ¹ (30°) ²		30° ¹ (60°) ²		45° angle		60° ¹ (30°) ²	
		8-Part	6-Part	8-Part	6-Part	8-Part	6-Part	8-Part	6-Part	8-Part	6-Part	8-Part	6-Part
3/32	6x7	0.74	0.55	0.60	0.45	0.42	0.32	1.1	0.83	0.90	0.68	0.64	0.48
1/8	6x7	1.3	0.98	1.1	0.80	0.76	0.57	2.0	1.5	1.6	1.2	1.1	0.85
3/16	6x7	2.9	2.2	2.4	1.8	1.7	1.3	4.4	3.3	3.6	2.7	2.5	1.9
3/32	7x7	0.89	0.67	0.72	0.55	0.51	0.39	1.3	1.0	1.1	0.82	0.77	0.58
1/8	7x7	1.6	1.2	1.3	1.0	0.95	0.71	2.5	1.8	2.0	1.5	1.4	1.1
3/16	7x7	3.6	2.7	2.9	2.2	2.1	1.5	5.4	4.0	4.4	3.3	3.1	2.3
3/16	6x19	3.0	2.2	2.4	1.8	1.7	1.3	4.5	3.4	3.7	2.8	2.6	1.9
1/4	6x19	5.3	4.0	4.3	3.2	3.1	2.3	8.0	6.0	6.5	4.9	4.6	3.4
5/16	6x19	8.3	6.2	6.7	5.0	4.8	3.6	12.0	9.3	10.0	7.6	7.1	5.4
3/8	6x19	12.0	8.9	9.7	7.2	6.8	5.1	18.0	13.0	14.0	11.0	10.0	7.7
7/16	6x19	16.0	12.0	13.0	9.8	9.3	6.9	24.0	18.0	20.0	15.0	14.0	10.0
1/2	6x19	21.0	15.0	17.0	13.0	12.0	9.0	31.0	23.0	25.0	19.0	18.0	13.0
9/16	6x19	26.0	20.0	21.0	16.0	15.0	11.0	39.0	29.0	32.0	24.0	23.0	17.0
5/8	6x19	32.0	24.0	26.0	20.0	19.0	14.0	48.0	36.0	40.0	30.0	28.0	21.0
3/4	6x19	46.0	35.0	38.0	28.0	27.0	20.0	69.0	52.0	56.0	42.0	40.0	30.0
7/8	6x19	62.0	47.0	51.0	38.0	36.0	27.0	94.0	70.0	76.0	57.0	54.0	40.0
1	6x19	81.0	61.0	66.0	50.0	47.0	35.0	122.0	91.0	99.0	74.0	70.0	53.0

¹ Vertical angles.

² Horizontal angles.

H

RIGGING EQUIPMENT FOR MATERIAL HANDLING

Oregon Administrative Rules
Oregon Occupational Safety
and Health Division

Table H-11 – Rated Capacities for Strand Laid Grommet – Hand Tucked
Improved Plow Steel Grade Rope

Rope body		Rated capacities, tons (2,000 lb.)		
Dia. (inches)	Constr.	Vertical	Choker	Vertical basket ¹
1/4	7x19	0.85	0.64	1.7
5/16	7x19	1.3	1.0	2.6
3/8	7x19	1.9	1.4	3.8
7/16	7x19	2.6	1.9	5.2
1/2	7x19	3.3	2.5	6.7
9/16	7x19	4.2	3.1	8.4
5/8	7x19	5.2	3.9	10.00
3/4	7x19	7.4	5.6	15.0
7/8	7x19	10.0	7.5	20.0
1	7x19	13.0	9.7	26.0
1 1/8	7x19	16.0	12.0	32.0
1 1/4	7x37	18.0	14.0	37.0
1 3/8	7x37	22.0	16.0	44.0
1 1/2	7x37	26.0	19.0	52.0

¹ These values only apply when the D/d ratio is 5 or greater where: D = Diameter of curvature around which rope is bent.
d = Diameter of rope body.

Table H-12 – Rated Capacities for Cable Laid Grommet – Hand Tucked
7x6x7 and 7x6x19 Construction Improved Plow Steel Grade Rope
7x7x7 Construction Galvanized Aircraft Grade Rope

Cable body		Rated capacities, tons (2,000 lb.)		
Dia. (inches)	Constr.	Vertical	Choker	Vertical basket ¹
3/8	7x6x7	1.3	0.95	2.5
9/16	7x6x7	2.8	2.1	5.6
5/8	7x6x7	3.8	2.8	7.6
3/8	7x7x7	1.6	1.2	3.2
9/16	7x7x7	3.5	2.6	6.9
5/8	7x7x7	4.5	3.4	9.0
5/8	7x6x19	3.9	3.0	7.9
3/4	7x6x19	5.1	3.8	10.0
15/16	7x6x19	7.9	5.9	16.0
1 1/8	7x6x19	11.0	8.4	22.0
1 5/16	7x6x19	15.0	11.0	30.0
1 1/2	7x6x19	19.0	14.0	39.0
1 11/16	7x6x19	24.0	18.0	49.0
1 7/8	7x6x19	30.0	22.0	60.0
2 1/4	7x6x19	42.0	31.0	84.0
2 5/8	7x6x19	56.0	42.0	112.0

¹ These values only apply when the D/d ratio is 5 or greater where: D = Diameter of curvature around which cable body is bent.
d = Diameter of cable body.

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

Table H-13 – Rated Capacities for Strand Laid Endless Slings – Mechanical Joint
Improved Plow Steel Grade Rope

Rope body		Rated capacities, tons (2,000 lb.)		
Dia. (inches)	Constr.	Vertical	Choker	Vertical basket ¹
1/4	² 6x19	0.92	0.69	1.8
3/8	² 6x19	2.0	1.5	4.1
1/2	² 6x19	3.6	2.7	7.2
5/8	² 6x19	5.6	4.2	11.0
3/4	² 6x19	8.0	6.0	16.0
7/8	² 6x19	11.0	8.1	21.0
1	² 6x19	14.0	10.0	28.0
1 1/8	² 6x19	18.0	13.0	35.0
1 1/4	² 6x37	21.0	15.0	41.0
1 3/8	² 6x37	25.0	19.0	50.0
1 1/2	² 6x37	29.0	22.0	59.0

¹ These values only apply when the D/d ratio is 5 or greater where: D = Diameter of curvature around which rope is bent.

d = Diameter of rope body.

² IWRC

Table H-14 – Rated Capacities for Cable Laid Endless Slings – Mechanical Joint
7x7x7 and 7x7x19 Construction Galvanized Aircraft Grade Rope
7x6x19 IWRC Construction Improved Plow Steel Grade Rope

Cable body		Rated capacities, tons (2,000 lb.)		
Dia. (inches)	Constr.	Vertical	Choker	Vertical basket ¹
1/4	7x7x7	0.83	0.62	1.6
3/8	7x7x7	1.8	1.3	3.5
1/2	7x7x7	3.0	2.3	6.1
5/8	7x7x7	4.5	3.4	9.1
3/4	7x7x7	6.3	4.7	12.0
5/8	7x7x19	4.7	3.5	9.5
3/4	7x7x19	6.7	5.0	13.0
7/8	7x7x19	8.9	6.6	18.0
1	7x7x19	11.0	8.5	22.0
1 1/8	7x7x19	14.0	10.0	28.0
1 1/4	7x7x19	17.0	12.0	33.0
3/4	² 7x6x19	6.2	4.7	12.0
7/8	² 7x6x19	8.3	6.2	16.0
1	² 7x6x19	10.0	7.9	21.0
1 1/8	² 7x6x19	13.0	9.7	26.0
1 1/4	² 7x6x19	16.0	12.0	31.0
1 3/8	² 7x6x19	18.0	14.0	37.0
1 1/2	² 7x6x19	22.0	16.0	43.0

¹ These values only apply when the D/d ratio is 5 or greater where: D = Diameter of curvature around which cable body is bent.

d = Diameter of cable body.

² IWRC

H

RIGGING EQUIPMENT FOR MATERIAL HANDLING

Oregon Administrative Rules
Oregon Occupational Safety
and Health Division

Table H-15 – Manila Rope Slings
[Angle of rope to vertical shown in parentheses]

Eye and eye sling								
Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 5)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	7.5	2,650	550	250	1,100	900	750	550
9/16	10.4	3,450	700	350	1,400	1,200	1,000	700
5/8	13.3	4,400	900	450	1,800	1,500	1,200	900
3/4	16.7	5,400	1,100	550	2,200	1,900	1,500	1,100
13/16	19.5	6,500	1,300	650	2,600	2,300	1,800	1,300
7/8	22.5	7,700	1,500	750	3,100	2,700	2,200	1,500
1	27.0	9,000	1,800	900	3,600	3,100	2,600	1,800
1 1/16	31.3	10,500	2,100	1,100	4,200	3,600	3,000	2,100
1 1/8	36.0	12,000	2,400	1,200	4,800	4,200	3,400	2,400
1 1/4	41.7	13,500	2,700	1,400	5,400	4,700	3,800	2,700
1 5/16	47.9	15,000	3,000	1,500	6,000	5,200	4,300	3,000
1 1/2	59.9	18,500	3,700	1,850	7,400	6,400	5,200	3,700
1 5/8	74.6	22,500	4,500	2,300	9,000	7,800	6,400	4,500
1 3/4	89.3	26,500	5,300	2,700	10,500	9,200	7,500	5,300
2	107.5	31,000	6,200	3,100	12,500	10,500	8,800	6,200
2 1/3	125.0	36,000	7,200	3,600	14,500	12,500	10,000	7,200
2 1/4	146.0	41,000	8,200	4,100	16,500	14,000	11,500	8,200
2 1/2	166.7	46,500	9,300	4,700	18,500	16,000	13,000	9,300
2 5/8	190.8	52,000	10,500	5,200	21,000	18,000	14,500	10,500

Endless sling

Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 5)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	7.5	2,650	950	500	1,900	1,700	1,400	950
9/16	10.4	3,450	1,200	600	2,500	2,200	1,800	1,200
5/8	13.3	4,400	1,600	800	3,200	2,700	2,200	1,600
3/4	16.7	5,400	2,000	950	3,900	3,400	2,800	2,000
13/16	19.5	6,500	2,300	1,200	4,700	4,100	3,300	2,300
7/8	22.5	7,700	2,800	1,400	5,600	4,800	3,900	2,800
1	27.0	9,000	3,200	1,600	6,500	5,600	4,600	3,200
1 1/16	31.3	10,500	3,800	1,900	7,600	6,600	5,400	3,800
1 1/8	36.0	12,000	4,300	2,200	8,600	7,500	6,100	4,300
1 1/4	41.7	13,500	4,900	2,400	9,700	8,400	6,900	4,900
1 5/16	47.9	15,000	5,400	2,700	11,000	9,400	7,700	5,400
1 1/2	59.9	18,500	6,700	3,300	13,500	11,500	9,400	6,700
1 5/8	74.6	22,500	8,100	4,100	16,000	14,000	11,500	8,000
1 3/4	89.3	26,500	9,500	4,800	19,000	16,500	13,500	9,500
2	107.5	31,000	11,000	5,600	22,500	19,500	16,000	11,000
2 1/3	125.0	36,000	13,000	6,500	26,000	22,500	18,500	13,000
2 1/4	146.0	41,000	15,000	7,400	29,500	25,500	21,000	15,000
2 1/2	166.7	46,500	16,500	8,400	33,500	29,000	23,500	16,500
2 5/8	190.8	52,000	18,500	9,500	37,500	32,500	26,500	18,500

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

Table H-16 – Nylon Rope Slings
[Angle of rope to vertical shown in parentheses]

Eye and eye sling								
Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 9)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	6.5	6,080	700	350	1,400	1,200	950	700
9/16	8.3	7,600	850	400	1,700	1,500	1,200	850
5/8	10.5	9,880	1,100	550	2,200	1,900	1,600	1,100
3/4	14.5	13,490	1,500	750	3,000	2,600	2,100	1,500
13/16	17.0	16,150	1,800	900	3,600	3,100	2,600	1,800
7/8	20.0	19,000	2,100	1,100	4,200	3,700	3,000	2,100
1	26.0	23,750	2,600	1,300	5,300	4,600	3,700	2,600
1 1/16	29.0	27,360	3,000	1,500	6,100	5,300	4,300	3,000
1 1/8	34.0	31,350	3,500	1,700	7,000	6,000	5,000	3,500
1 1/4	40.0	35,625	4,000	2,000	7,900	6,900	5,600	4,000
1 5/16	45.0	40,850	4,500	2,300	9,100	7,900	6,400	4,500
1 1/2	55.0	50,350	5,600	2,800	11,000	9,700	7,900	5,600
1 5/8	68.0	61,750	6,900	3,400	13,500	12,000	9,700	6,900
1 3/4	83.0	74,100	8,200	4,100	16,500	14,500	11,500	8,200
2	95.0	87,400	9,700	4,900	19,500	17,000	13,500	9,700
2 1/8	109.0	100,700	11,000	5,600	22,500	19,500	16,000	11,000
2 1/4	129.0	118,750	13,000	6,600	26,500	23,000	18,500	13,000
2 1/2	149.0	133,000	15,000	7,400	29,500	25,500	21,000	15,000
2 5/8	168.0	153,900	17,100	8,600	34,000	29,500	24,000	17,000

Endless sling

Endless sling								
Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 9)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	6.5	6,080	1,200	600	2,400	2,100	1,700	1,200
9/16	8.3	7,600	1,500	750	3,000	2,600	2,200	1,500
5/8	10.5	9,880	2,000	1,000	4,000	3,400	2,800	2,000
3/4	14.5	13,490	2,700	1,400	5,400	4,700	3,800	2,700
13/16	17.0	16,150	3,200	1,600	6,400	5,600	4,600	3,200
7/8	20.0	19,000	3,800	1,900	7,600	6,600	5,400	3,800
1	26.0	23,750	4,800	2,400	9,500	8,200	6,700	4,800
1 1/16	29.0	27,360	5,500	2,700	11,000	9,500	7,700	5,500
1 1/8	34.0	31,350	6,300	3,100	12,500	11,000	8,900	6,300
1 1/4	40.0	35,625	7,100	3,600	14,500	12,500	10,000	7,100
1 5/16	45.0	40,850	8,200	4,100	16,500	14,000	12,000	8,200
1 1/2	55.0	50,350	10,000	5,000	20,000	17,500	14,000	10,000
1 5/8	68.0	61,750	12,500	6,200	24,500	21,500	17,500	12,500
1 3/4	83.0	74,100	15,000	7,400	29,500	27,500	21,000	15,000
2	95.0	87,400	17,500	8,700	35,000	30,500	24,500	17,500
2 1/8	109.0	100,700	20,000	10,000	40,500	35,000	28,500	20,000
2 1/4	129.0	118,750	24,000	12,000	47,500	41,000	33,500	24,000
2 1/2	149.0	133,000	26,500	13,500	53,000	46,000	37,500	26,500
2 5/8	168.0	153,900	31,000	15,500	61,500	53,500	43,500	31,000

H

RIGGING EQUIPMENT FOR MATERIAL HANDLING

Oregon Administrative Rules
Oregon Occupational Safety
and Health Division

Table H-17 – Polyester Rope Slings
[Angle of rope to vertical shown in parentheses]

Eye and eye sling								
Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 9)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	8.0	6,080	700	350	1,400	1,200	950	700
9/16	10.2	7,600	850	400	1,700	1,500	1,200	850
5/8	13.0	9,500	1,100	550	2,100	1,800	1,500	1,100
3/4	17.5	11,875	1,300	650	2,600	2,300	1,900	1,300
13/16	21.0	14,725	1,600	800	3,300	2,800	2,300	1,600
7/8	25.0	17,100	1,900	950	3,800	3,300	2,700	1,900
1	30.5	20,900	2,300	1,200	4,600	4,000	3,300	2,300
1 1/16	34.5	24,225	2,700	1,300	5,400	4,700	3,800	2,700
1 1/8	40.0	28,025	3,100	1,600	6,200	5,400	4,400	3,100
1 1/4	46.3	31,540	3,500	1,800	7,000	6,100	5,000	3,500
1 5/16	52.5	35,625	4,000	2,000	7,900	6,900	5,600	4,000
1 1/2	66.8	44,460	4,900	2,500	9,900	8,600	7,000	4,900
1 5/8	82.0	54,150	6,000	3,000	12,000	10,400	8,500	6,000
1 3/4	98.0	64,410	7,200	3,600	14,500	12,500	10,000	7,200
2	118.0	76,000	8,400	4,200	17,000	14,500	12,000	8,400
2 1/8	135.0	87,400	9,700	4,900	19,500	17,000	13,500	9,700
2 1/4	157.0	101,650	11,500	5,700	22,500	19,500	16,000	11,500
2 1/2	181.0	115,900	13,000	6,400	26,000	22,500	18,000	13,000
2 5/8	205.0	130,150	14,500	7,200	29,000	25,000	20,500	14,500

Endless sling

Endless sling								
Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 9)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	8.0	6,080	1,200	600	2,400	2,100	1,700	1,200
9/16	10.2	7,600	1,500	750	3,000	2,600	2,200	1,500
5/8	13.0	9,500	1,900	950	3,800	3,300	2,700	1,900
3/4	17.5	11,875	2,400	1,200	4,800	4,100	3,400	2,400
13/16	21.0	14,725	2,900	1,500	5,900	5,100	4,200	2,900
7/8	25.0	17,100	3,400	1,700	6,800	5,900	4,800	3,400
1	30.5	20,900	4,200	2,100	8,400	7,200	5,900	4,200
1 1/16	34.5	24,225	4,800	2,400	9,700	8,400	6,900	4,800
1 1/8	40.0	28,025	5,600	2,800	11,000	9,700	7,900	5,600
1 1/4	46.3	31,540	6,300	3,200	12,500	11,000	8,900	6,300
1 5/16	52.5	35,625	7,100	3,600	14,500	12,500	10,000	7,100
1 1/2	66.8	44,460	8,900	4,400	18,000	15,500	12,500	8,900
1 5/8	82.0	54,150	11,000	5,400	21,500	19,000	15,500	11,000
1 3/4	98.0	64,410	13,000	6,400	26,000	22,500	18,000	13,000
2	118.0	76,000	15,000	7,600	30,500	26,500	21,500	15,000
2 1/8	135.0	87,400	17,500	8,700	35,000	30,500	24,500	17,500
2 1/4	157.0	101,650	20,500	10,000	40,500	35,000	29,000	20,500
2 1/2	181.0	115,900	23,000	11,500	46,500	40,000	33,000	23,000
2 5/8	205.0	130,150	26,000	13,000	52,000	45,000	37,000	26,000

RIGGING EQUIPMENT FOR MATERIAL HANDLING

H

Table H-18 – Polypropylene Rope Slings
[Angle of rope to vertical shown in parentheses]

Eye and eye sling								
Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 6)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	4.7	3,990	650	350	1,300	1,200	950	650
9/16	6.1	4,845	800	400	1,600	1,400	1,100	800
5/8	7.5	5,890	1,000	500	2,000	1,700	1,400	1,000
3/4	10.7	8,075	1,300	700	2,700	2,300	1,900	1,300
13/16	12.7	9,405	1,600	800	3,100	2,700	2,200	1,600
7/8	15.0	10,925	1,800	900	3,600	3,200	2,600	1,800
1	18.0	13,300	2,200	1,100	4,400	3,800	3,100	2,200
1 1/16	20.4	15,200	2,500	1,300	5,100	4,400	3,600	2,500
1 1/8	23.7	17,385	2,900	1,500	5,800	5,000	4,100	2,900
1 1/4	27.0	19,950	3,300	1,700	6,700	5,800	4,700	3,300
1 5/16	30.5	22,325	3,700	1,900	7,400	6,400	5,300	3,700
1 1/2	38.5	28,215	4,700	2,400	9,400	8,100	6,700	4,700
1 5/8	47.5	34,200	5,700	2,900	11,500	9,900	8,100	5,700
1 3/4	57.0	40,850	6,800	3,400	13,500	12,000	9,600	6,800
2	69.0	49,400	8,200	4,100	16,500	14,500	11,500	8,200
2 1/8	80.0	57,950	9,700	4,800	19,500	16,500	13,500	9,700
2 1/4	92.0	65,550	11,000	5,500	22,000	19,000	15,500	11,000
2 1/2	107.0	76,000	12,500	6,300	25,500	22,000	18,000	12,500
2 5/8	120.0	85,500	14,500	7,100	28,500	24,500	20,000	14,500

Endless sling

Endless sling								
Rope diameter nominal in inches	Nominal weight per 100 ft. in pounds	Minimum breaking strength in pounds	Rated capacity in pounds (safety factor = 6)					
			Vertical hitch	Choker hitch	Basket hitch; angle of rope to horizontal			
					90° (0°)	60° (30°)	45° (45°)	30° (60°)
1/2	4.7	3,990	1,200	600	2,400	2,100	1,700	1,200
9/16	6.1	4,845	1,500	750	2,900	2,500	2,100	1,500
5/8	7.5	5,890	1,800	900	3,500	3,100	2,500	1,800
3/4	10.7	8,075	2,400	1,200	4,900	4,200	3,400	2,400
13/16	12.7	9,405	2,800	1,400	5,600	4,900	4,000	2,800
7/8	15.0	10,925	3,300	1,600	6,600	5,700	4,600	3,300
1	18.0	13,300	4,000	2,000	8,000	6,900	5,600	4,000
1 1/16	20.4	15,200	4,600	2,300	9,100	7,900	6,500	4,600
1 1/8	23.7	17,385	5,200	2,600	10,500	9,000	7,400	5,200
1 1/4	27.0	19,950	6,000	3,000	12,000	10,500	8,500	6,000
1 5/16	30.5	22,325	6,700	3,400	13,500	11,500	9,500	6,700
1 1/2	38.5	28,215	8,500	4,200	17,000	14,500	12,000	8,500
1 5/8	47.5	34,200	10,500	5,100	20,500	18,000	14,500	10,500
1 3/4	57.0	40,850	12,500	6,100	24,500	21,000	17,500	12,500
2	69.0	49,400	15,000	7,400	29,500	25,500	21,000	15,000
2 1/8	80.0	57,950	17,500	8,700	35,000	30,100	24,500	17,500
2 1/4	92.0	65,550	19,500	9,900	39,500	34,000	28,000	19,500
2 1/2	107.0	76,000	23,000	11,500	45,500	39,500	32,500	23,000
2 5/8	120.0	85,500	25,500	13,000	51,500	44,500	36,500	25,500

H

RIGGING EQUIPMENT FOR MATERIAL HANDLING

Oregon Administrative Rules
Oregon Occupational Safety
and Health Division

Table H-19 – Safe Working Loads for Shackles
[In tons of 2,000 pounds]

Material size (inches)	Pin diameter (inches)	Safe working load
1/2	5/8	1.4
5/8	3/4	2.2
3/4	7/8	3.2
7/8	1	4.3
1	1 1/8	5.6
1 1/8	1 1/4	6.7
1 1/4	1 3/8	8.2
1 3/8	1 1/2	10.0
1 1/2	1 3/4	11.9
1 3/4	2	16.2
2	2 1/4	21.2

Table H-20 – Number and Spacing of U-Bolt Wire Rope Clips

Improved plow steel, rope diameter (inches)	Number of clips		Minimum spacing (inches)
	Drop forged	Other material	
1/2	3	4	3
5/8	3	4	3 3/4
3/4	4	5	4 1/2
7/8	4	5	5 1/4
1	5	6	6
1 1/8	6	6	6 3/4
1 1/4	6	7	7 1/2
1 3/8	7	7	8 1/4
1 1/2	7	8	9

Stat. Auth.: ORS 654.025(2) and 656.726(4).

Stats. Implemented: ORS 654.001 through 654.295.

Hist: APD Admin. Order 8-1989, f. 7/7/89, ef. 7/7/89.

OR-OSHA Admin. Order 6-1998, f. 10/15/98, ef. 10/15/98.

OR-OSHA Admin. Order 4-2011, f. 12/8/11, ef. 12/8/11.

DISPOSAL OF WASTE MATERIALS

H

§1926.252 Disposal of Waste Materials.

(a) Whenever materials are dropped more than 20 feet to any point lying outside the exterior walls of the building, an enclosed chute of wood, or equivalent material, shall be used. For the purpose of this paragraph, an enclosed chute is a slide, closed in on all sides, through which material is moved from a high place to a lower one.

(b) When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped shall be completely enclosed with barricades not less than 42 inches high and not less than 6 feet back from the projected edge of the opening above. Signs warning of the hazard of falling materials shall be posted at each level. Removal shall not be permitted in this lower area until debris handling ceases above.

(c) All scrap lumber, waste material, and rubbish shall be removed from the immediate work area as the work progresses.

(d) Disposal of waste material or debris by burning shall comply with local fire regulations.

(e) All solvent waste, oily rags, and flammable liquids shall be kept in fire resistant covered containers until removed from worksite.

Stat. Auth.: ORS 654.025(2) and 656.726(3).

Hist: APD Admin. Order 8-1989, f. 7/7/89, ef. 7/7/89.

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