

(b) *Hoists and elevators.* (1) An examination of the rope fastenings for defects;

(2) An examination of sheaves for broken flanges, defective bearings, rope alignment, and proper lubrication; and

(3) An examination of the automatic controls and brakes required under § 77.1401.

(Sec. 101, Federal Mine Safety and Health Act of 1977, Pub. L. 91-173 as amended by Pub. L. 95-164, 91 Stat. 1291 (30 U.S.C. 811)

[48 FR 53241, Nov. 25, 1983]

§ 77.1404 Certifications and records of daily examinations.

At the completion of each daily examination required by § 77.1403, the person making the examination shall certify, by signature and date, that the examination has been made. If any unsafe condition is found during the examinations required by § 77.1403, the person conducting the examination shall make a record of the condition and the date. Certifications and records shall be retained for one year.

(Sec. 101, Federal Mine Safety and Health Act of 1977, Pub. L. 91-173 as amended by Pub. L. 95-164, 91 Stat. 1291 (30 U.S.C. 811))

[48 FR 53241, Nov. 25, 1983, as amended at 60 FR 33723, June 29, 1995]

§ 77.1405 Operation of hoisting equipment after repairs.

Empty conveyances shall be operated at least one round trip before hoisting persons after any repairs.

(Sec. 101, Federal Mine Safety and Health Act of 1977, Pub. L. 91-173 as amended by Pub. L. 95-164, 91 Stat. 1291 (30 U.S.C. 811))

[48 FR 53241, Nov. 25, 1983]

WIRE ROPES

AUTHORITY: Sections 77.1430 through 77.1438 issued under sec. 101, Federal Mine Safety and Health Act of 1977, Pub. L. 91-173 as amended by Pub. L. 95-164, 91 Stat. 1291 (30 U.S.C. 811).

SOURCE: Sections 77.1430 through 77.1438 appear at 48 FR 53241, Nov. 25, 1983, unless otherwise noted.

§ 77.1430 Wire ropes; scope.

(a) Sections 77.1431 through 77.1438 apply to wire ropes in service used to hoist—

(1) Persons in shafts and slopes underground;

(2) Persons with an incline hoist on the surface; or

(3) Loads in shaft or slope development when persons work below suspended loads.

(b) These standards do not apply to wire ropes used for elevators.

§ 77.1431 Minimum rope strength.

At installation, the nominal strength (manufacturer's published catalog strength) of wire ropes used for hoisting shall meet the minimum rope strength values obtained by the following formulas in which "L" equals the maximum suspended rope length in feet:

(a) *Winding drum ropes* (all constructions, including rotation resistant).

For rope lengths less than 3,000 feet:

$$\text{Minimum Value} = \text{Static Load} \times (7.0 - 0.001L)$$

For rope lengths 3,000 feet or greater:

$$\text{Minimum Value} = \text{Static Load} \times 4.0$$

(b) *Friction drum ropes.*

For rope lengths less than 4,000 feet:

$$\text{Minimum Value} = \text{Static Load} \times (7.0 - 0.0005L)$$

For rope lengths 4,000 feet or greater:

$$\text{Minimum Value} = \text{Static Load} \times 5.0$$

(c) *Tail ropes* (balance ropes).

$$\text{Minimum Value} = \text{Weight of Rope} \times 7.0$$

[48 FR 53241, Nov. 25, 1983; 48 FR 54975, Dec. 8, 1983]

§ 77.1432 Initial measurement.

After initial rope stretch but before visible wear occurs, the rope diameter of newly installed wire ropes shall be measured at least once in every third interval of active length and the measurements averaged to establish a baseline for subsequent measurements. A record of the measurements and the date shall be made by the person taking the measurements. This record shall be retained until the rope is retired from service.

[48 FR 53241, Nov. 25, 1983, as amended at 60 FR 33723, June 29, 1995]

§ 77.1433 Examinations.

(a) At least once every fourteen calendar days, each wire rope in service shall be visually examined along its entire active length for visible structural

§ 77.1434

30 CFR Ch. I (7-1-00 Edition)

damage, corrosion, and improper lubrication or dressing. In addition, visual examination for wear and broken wires shall be made at stress points, including the area near attachments, where the rope rests on sheaves, where the rope leaves the drum, at drum crossovers, and at change-of-layer regions. When any visible condition that results in a reduction of rope strength is present, the affected portion of the rope shall be examined on a daily basis.

(b) Before any person is hoisted with a newly installed wire rope or any wire rope that has not been examined in the previous fourteen calendar days, the wire rope shall be examined in accordance with paragraph (a) of this section.

(c) At least once every six months, nondestructive tests shall be conducted of the active length of the rope, or rope diameter measurements shall be made—

- (1) Wherever wear is evident;
- (2) Where the hoist rope rests on sheaves at regular stopping points;
- (3) Where the hoist rope leaves the drum at regular stopping points; and
- (4) At drum crossover and change-of-layer regions.

(d) At the completion of each examination required by paragraph (a) of this section, the person making the examination shall certify, by signature and date, that the examination has been made. If any condition listed in paragraph (a) of this standard is present, the person conducting the examination shall make a record of the condition and the date. Certifications and records of examinations shall be retained for one year.

(e) The person making the measurements or nondestructive tests as required by paragraph (c) of this section shall record the measurements or test results and the date. This record shall be retained until the rope is retired from service.

[48 FR 53241, Nov. 25, 1983; 48 FR 54975, Dec. 8, 1983, 60 FR 33723, June 29, 1995]

§ 77.1434 Retirement criteria.

Unless damage or deterioration is removed by cutoff, wire ropes shall be removed from service when any of the following conditions occurs:

(a) The number of broken wires within a rope lay length, excluding filler wires, exceeds either—

(1) Five percent of the total number of wires; or

(2) Fifteen percent of the total number of wires within any strand;

(b) On a regular lay rope, more than one broken wire in the valley between strands in one rope lay length;

(c) A loss of more than one-third of the original diameter of the outer wires;

(d) Rope deterioration from corrosion;

(e) Distortion of the rope structure;

(f) Heat damage from any source;

(g) Diameter reduction due to wear that exceeds six percent of the baseline diameter measurement; or

(h) Loss of more than ten percent of rope strength as determined by non-destructive testing.

§ 77.1435 Load end attachments.

(a) Wire rope shall be attached to the load by a method that develops at least 80 percent of the nominal strength of the rope.

(b) Except for terminations where use of other materials is a design feature, zinc (spelter) 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.

(c) Load end attachment methods using splices are prohibited.

§ 77.1436 Drum end attachment.

(a) For drum end attachment, wire rope shall be attached—

(1) Securely by clips after making one full turn around the drum spoke;

(2) Securely by clips after making one full turn around the shaft, if the drum is fixed to the shaft; or

(3) By properly assembled anchor bolts, clamps, or wedges, provided that the attachment is a design feature of the hoist drum. Design feature means either the manufacturer's original design or a design approved by a registered professional engineer.

(b) A minimum of three full turns of wire rope shall be on the drum when the rope is extended to its maximum working length.