

The Electronic Code of Federal Regulations

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EDITORIAL NOTE ON PART 1926

Editorial Notes:

1. At [44 FR 8577](#), Feb. 9, 1979, and corrected at [44 FR 20940](#), Apr. 6, 1979, OSHA reprinted without change the entire text of [29 CFR part 1926](#) together with certain General Industry Occupational Safety and Health Standards contained in [29 CFR part 1910](#), which have been identified as also applicable to construction work. This republication developed a single set of OSHA regulations for both labor and management forces within the construction industry.

2. Nomenclature changes to part 1926 appear at [84 FR 21597](#), May 14, 2019.

§ 1926.1412 Inspections.

(a) *Modified equipment.*

(1) Equipment that has had modifications or additions which affect the safe operation of the equipment (such as modifications or additions involving a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) or capacity must be inspected by a qualified person after such modifications/additions have been completed, prior to initial use. The inspection must meet all of the following requirements:

(i) The inspection must assure that the modifications or additions have been done in accordance with the approval obtained pursuant to [§ 1926.1434](#) (Equipment modifications).

(ii) The inspection must include functional testing of the equipment.

(2) Equipment must not be used until an inspection under this paragraph demonstrates that the requirements of [paragraph \(a\)\(1\)\(i\)](#) of this section have been met.

(b) *Repaired/adjusted equipment.*

(1) Equipment that has had a repair or adjustment that relates to safe operation (such as: A repair or adjustment to a safety device or operator aid, or to a

critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism), must be inspected by a qualified person after such a repair or adjustment has been completed, prior to initial use. The inspection must meet all of the following requirements:

- (i) The qualified person must determine if the repair/adjustment meets manufacturer equipment criteria (where applicable and available).
- (ii) Where manufacturer equipment criteria are unavailable or inapplicable, the qualified person must:
 - (A) Determine if a registered professional engineer (RPE) is needed to develop criteria for the repair/adjustment. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE.
 - (B) Determine if the repair/adjustment meets the criteria developed in accordance with [paragraph \(b\)\(1\)\(ii\)\(A\)](#) of this section.
- (iii) The inspection must include functional testing of the repaired/adjusted parts and other components that may be affected by the repair/adjustment.

(4) Equipment must not be used until an inspection under this paragraph demonstrates that the repair/adjustment meets the requirements of [paragraph \(b\)\(1\)\(i\)](#) of this section (or, where applicable, [paragraph \(b\)\(1\)\(ii\)](#) of this section).
- (c) *Post-assembly.*
 - (1) Upon completion of assembly, the equipment must be inspected by a qualified person to assure that it is configured in accordance with manufacturer equipment criteria.
 - (2) Where manufacturer equipment criteria are unavailable, a qualified person must:
 - (i) Determine if a registered professional engineer (RPE) familiar with the type of equipment involved is needed to develop criteria for the equipment configuration. If an RPE is not needed, the employer must ensure that the criteria are developed by the qualified person. If an RPE is needed, the employer must ensure that they are developed by an RPE.
 - (ii) Determine if the equipment meets the criteria developed in accordance with [paragraph \(c\)\(2\)\(i\)](#) of this section.
 - (3) Equipment must not be used until an inspection under this paragraph demonstrates that the equipment is configured in accordance with the applicable criteria.
- (d) *Each shift.*

(1) A competent person must begin a visual inspection prior to each shift the equipment will be used, which must be completed before or during that shift. The inspection must consist of observation for apparent deficiencies. Taking apart equipment components and booming down is not required as part of this inspection unless the results of the visual inspection or trial operation indicate that further investigation necessitating taking apart equipment components or booming down is needed. Determinations made in conducting the inspection must be reassessed in light of observations made during operation. At a minimum the inspection must include all of the following:

- (i) Control mechanisms for maladjustments interfering with proper operation.
- (ii) Control and drive mechanisms for apparent excessive wear of components and contamination by lubricants, water or other foreign matter.
- (iii) Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.
- (iv) Hydraulic system for proper fluid level.
- (v) Hooks and latches for deformation, cracks, excessive wear, or damage such as from chemicals or heat.
- (vi) Wire rope reeving for compliance with the manufacturer's specifications.
- (vii) Wire rope, in accordance with [§ 1926.1413\(a\)](#).
- (viii) Electrical apparatus for malfunctioning, signs of apparent excessive deterioration, dirt or moisture accumulation.
- (ix) Tires (when in use) for proper inflation and condition.
- (x) Ground conditions around the equipment for proper support, including ground settling under and around outriggers/stabilizers and supporting foundations, ground water accumulation, or similar conditions. This paragraph does not apply to the inspection of ground conditions for railroad tracks and their underlying support when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under [49 CFR part 213](#).
- (xi) The equipment for level position within the tolerances specified by the equipment manufacturer's recommendations, both before each shift and after each move and setup.
- (xii) Operator cab windows for significant cracks, breaks, or other deficiencies that would hamper the operator's view.
- (xiii) Rails, rail stops, rail clamps and supporting surfaces when the equipment has rail traveling. This paragraph does not apply to the inspection of rails,

rail stops, rail clamps and supporting surfaces when the railroad tracks are part of the general railroad system of transportation that is regulated pursuant to the Federal Railroad Administration under [49 CFR part 213](#).

(xiv) Safety devices and operational aids for proper operation.

(2) If any deficiency in [paragraphs \(d\)\(1\)\(i\)](#) through [\(xiii\)](#) of this section (or in additional inspection items required to be checked for specific types of equipment in accordance with other sections of this standard) is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, the equipment must be taken out of service until it has been corrected. See [§ 1926.1417](#).

(3) If any deficiency in [paragraph \(d\)\(1\)\(xiv\)](#) of this section (safety devices/operational aids) is identified, the action specified in [§§ 1926.1415](#) and [1926.1416](#) must be taken prior to using the equipment.

(e) *Monthly.*

(1) Each month the equipment is in service it must be inspected in accordance with [paragraph \(d\)](#) of this section (each shift).

(2) Equipment must not be used until an inspection under this paragraph demonstrates that no corrective action under [paragraphs \(d\)\(2\)](#) and [\(3\)](#) of this section is required.

(3) *Documentation.*

(i) The following information must be documented and maintained by the employer that conducts the inspection:

(A) The items checked and the results of the inspection.

(B) The name and signature of the person who conducted the inspection and the date.

(ii) This document must be retained for a minimum of three months.

(f) *Annual/comprehensive.*

(1) At least every 12 months the equipment must be inspected by a qualified person in accordance with [paragraph \(d\)](#) of this section (each shift) except that the corrective action set forth in [paragraphs \(f\)\(4\)](#), [\(f\)\(5\)](#), and [\(f\)\(6\)](#) of this section must apply in place of the corrective action required by [paragraphs \(d\)\(2\)](#) and [\(d\)\(3\)](#) of this section.

(2) In addition, at least every 12 months, the equipment must be inspected by a qualified person. Disassembly is required, as necessary, to complete the inspection. The equipment must be inspected for all of the following:

- (i) Equipment structure (including the boom and, if equipped, the jib):
 - (A) Structural members: Deformed, cracked, or significantly corroded.
 - (B) Bolts, rivets and other fasteners: loose, failed or significantly corroded.
 - (C) Welds for cracks.
- (ii) Sheaves and drums for cracks or significant wear.
- (iii) Parts such as pins, bearings, shafts, gears, rollers and locking devices for distortion, cracks or significant wear.
- (iv) Brake and clutch system parts, linings, pawls and ratchets for excessive wear.
- (v) Safety devices and operational aids for proper operation (including significant inaccuracies).
- (vi) Gasoline, diesel, electric, or other power plants for safety-related problems (such as leaking exhaust and emergency shut-down feature) and conditions, and proper operation.
- (vii) Chains and chain drive sprockets for excessive wear of sprockets and excessive chain stretch.
- (viii) Travel steering, brakes, and locking devices, for proper operation.
- (ix) Tires for damage or excessive wear.
- (x) Hydraulic, pneumatic and other pressurized hoses, fittings and tubing, as follows:
 - (A) Flexible hose or its junction with the fittings for indications of leaks.
 - (B) Threaded or clamped joints for leaks.
 - (C) Outer covering of the hose for blistering, abnormal deformation or other signs of failure/impending failure.
 - (D) Outer surface of a hose, rigid tube, or fitting for indications of excessive abrasion or scrubbing.
- (xi) Hydraulic and pneumatic pumps and motors, as follows:
 - (A) Performance indicators: Unusual noises or vibration, low operating speed, excessive heating of the fluid, low pressure.
 - (B) Loose bolts or fasteners.
 - (C) Shaft seals and joints between pump sections for leaks.
- (xii) Hydraulic and pneumatic valves, as follows:
 - (A) Spools: Sticking, improper return to neutral, and leaks.

- (B) Leaks.
- (C) Valve housing cracks.
- (D) Relief valves: Failure to reach correct pressure (if there is a manufacturer procedure for checking pressure, it must be followed).
- (xiii) Hydraulic and pneumatic cylinders, as follows:
 - (A) Drifting caused by fluid leaking across the piston.
 - (B) Rod seals and welded joints for leaks.
 - (C) Cylinder rods for scores, nicks, or dents.
 - (D) Case (barrel) for significant dents.
 - (E) Rod eyes and connecting joints: Loose or deformed.
- (xiv) Outrigger or stabilizer pads/floats for excessive wear or cracks.
- (xv) Slider pads for excessive wear or cracks.
- (xvi) Electrical components and wiring for cracked or split insulation and loose or corroded terminations.
- (xvii) Warning labels and decals originally supplied with the equipment by the manufacturer or otherwise required under this standard: Missing or unreadable.
- (xviii) Originally equipped operator seat (or equivalent): Missing.
- (xix) Operator seat: Unserviceable.
- (xx) Originally equipped steps, ladders, handrails, guards: Missing.
- (xxi) Steps, ladders, handrails, guards: In unusable/unsafe condition.
- (3) This inspection must include functional testing to determine that the equipment as configured in the inspection is functioning properly.
- (4) If any deficiency is identified, an immediate determination must be made by the qualified person as to whether the deficiency constitutes a safety hazard or, though not yet a safety hazard, needs to be monitored in the monthly inspections.
- (5) If the qualified person determines that a deficiency is a safety hazard, the equipment must be taken out of service until it has been corrected, except when temporary alternative measures are implemented as specified in [§ 1926.1416\(d\)](#) or [§ 1926.1435\(e\)](#). See [§ 1926.1417](#).

- (6) If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, the employer must ensure that the deficiency is checked in the monthly inspections.
- (7) *Documentation of annual/comprehensive inspection.* The following information must be documented, maintained, and retained for a minimum of 12 months, by the employer that conducts the inspection:
- (i) The items checked and the results of the inspection.
 - (ii) The name and signature of the person who conducted the inspection and the date.
- (g) *Severe service.* Where the severity of use/conditions is such that there is a reasonable probability of damage or excessive wear (such as loading that may have exceeded rated capacity, shock loading that may have exceeded rated capacity, prolonged exposure to a corrosive atmosphere), the employer must stop using the equipment and a qualified person must:
- (1) Inspect the equipment for structural damage to determine if the equipment can continue to be used safely.
 - (2) In light of the use/conditions determine whether any items/conditions listed in [paragraph \(f\)](#) of this section need to be inspected; if so, the qualified person must inspect those items/conditions.
 - (3) If a deficiency is found, the employer must follow the requirements in [paragraphs \(f\)\(4\)](#) through [\(6\)](#) of this section.
- (h) *Equipment not in regular use.* Equipment that has been idle for 3 months or more must be inspected by a qualified person in accordance with the requirements of paragraph (e) (Monthly) of this section before initial use.
- (i) [Reserved]
- (j) Any part of a manufacturer's procedures regarding inspections that relate to safe operation (such as to a safety device or operational aid, critical part of a control system, power plant, braking system, load-sustaining structural components, load hook, or in-use operating mechanism) that is more comprehensive or has a more frequent schedule of inspection than the requirements of this section must be followed.
- (k) All documents produced under this section must be available, during the applicable document retention period, to all persons who conduct inspections under this section.

ECFR CONTENT

Editorial Notes:

1. At [44 FR 8577](#), Feb. 9, 1979, and corrected at [44 FR 20940](#), Apr. 6, 1979, OSHA reprinted without change the entire text of [29 CFR part 1926](#) together with certain General Industry Occupational Safety and Health Standards contained in [29 CFR part 1910](#), which have been identified as also applicable to construction work. This republication developed a single set of OSHA regulations for both labor and management forces within the construction industry.

2. Nomenclature changes to part 1926 appear at [84 FR 21597](#), May 14, 2019.

§ 1926.1413 Wire rope—inspection.

(a) *Shift inspection.*

(1) A competent person must begin a visual inspection prior to each shift the equipment is used, which must be completed before or during that shift. The inspection must consist of observation of wire ropes (running and standing) that are likely to be in use during the shift for apparent deficiencies, including those listed in [paragraph \(a\)\(2\)](#) of this section. Untwisting (opening) of wire rope or booming down is not required as part of this inspection.

(2) *Apparent deficiencies —*

(i) *Category I.* Apparent deficiencies in this category include the following:

(A) Significant distortion of the wire rope structure such as kinking, crushing, unstranding, birdcaging, signs of core failure or steel core protrusion between the outer strands.

(B) Significant corrosion.

(C) Electric arc damage (from a source other than power lines) or heat damage.

(D) Improperly applied end connections.

(E) Significantly corroded, cracked, bent, or worn end connections (such as from severe service).

(ii) *Category II.* Apparent deficiencies in this category are:

(A) Visible broken wires, as follows:

(1) In running wire ropes: Six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay, where a rope lay is the length along the rope in which one strand makes a complete revolution around the rope.

(2) In rotation resistant ropes: Two randomly distributed broken wires in six rope diameters or four randomly distributed broken wires in 30 rope diameters.

- (3) In pendants or standing wire ropes: More than two broken wires in one rope lay located in rope beyond end connections and/or more than one broken wire in a rope lay located at an end connection.
- (B) A diameter reduction of more than 5% from nominal diameter.
- (iii) *Category III.* Apparent deficiencies in this category include the following:
 - (A) In rotation resistant wire rope, core protrusion or other distortion indicating core failure.
 - (B) Prior electrical contact with a power line.
 - (C) A broken strand.
- (3) *Critical review items.* The competent person must give particular attention to all of the following:
 - (i) Rotation resistant wire rope in use.
 - (ii) Wire rope being used for boom hoists and luffing hoists, particularly at reverse bends.
 - (iii) Wire rope at flange points, crossover points and repetitive pickup points on drums.
 - (iv) Wire rope at or near terminal ends.
 - (v) Wire rope in contact with saddles, equalizer sheaves or other sheaves where rope travel is limited.
- (4) *Removal from service.*
 - (i) If a deficiency in Category I (see [paragraph \(a\)\(2\)\(i\)](#) of this section) is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, operations involving use of the wire rope in question must be prohibited until:
 - (A) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (B) If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
 - (ii) If a deficiency in Category II (see [paragraph \(a\)\(2\)\(ii\)](#) of this section) is identified, operations involving use of the wire rope in question must be prohibited until:

- (A) The employer complies with the wire rope manufacturer's established criterion for removal from service or a different criterion that the wire rope manufacturer has approved in writing for that specific wire rope (see [§ 1926.1417](#)),
 - (B) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (C) If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
- (iii) If a deficiency in Category III is identified, operations involving use of the wire rope in question must be prohibited until:
- (A) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (B) If the deficiency (other than power line contact) is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. Repair of wire rope that contacted an energized power line is also prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
- (iv) Where a wire rope is required to be removed from service under this section, either the equipment (as a whole) or the hoist with that wire rope must be tagged-out, in accordance with [§ 1926.1417\(f\)\(1\)](#), until the wire rope is repaired or replaced.
- (b) *Monthly inspection.*
- (1) Each month an inspection must be conducted in accordance with paragraph (a) (shift inspection) of this section.
 - (2) The inspection must include any deficiencies that the qualified person who conducts the annual inspection determines under [paragraph \(c\)\(3\)\(ii\)](#) of this section must be monitored.
 - (3) Wire ropes on equipment must not be used until an inspection under this paragraph demonstrates that no corrective action under [paragraph \(a\)\(4\)](#) of this section is required.
 - (4) The inspection must be documented according to [§ 1926.1412\(e\)\(3\)](#) (monthly inspection documentation).
- (c) *Annual/comprehensive.*

- (1) At least every 12 months, wire ropes in use on equipment must be inspected by a qualified person in accordance with [paragraph \(a\)](#) of this section (shift inspection).
- (2) In addition, at least every 12 months, the wire ropes in use on equipment must be inspected by a qualified person, as follows:
 - (i) The inspection must be for deficiencies of the types listed in [paragraph \(a\)\(2\)](#) of this section.
 - (ii) The inspection must be complete and thorough, covering the surface of the entire length of the wire ropes, with particular attention given to all of the following:
 - (A) Critical review items listed in [paragraph \(a\)\(3\)](#) of this section.
 - (B) Those sections that are normally hidden during shift and monthly inspections.
 - (C) Wire rope subject to reverse bends.
 - (D) Wire rope passing over sheaves.
 - (iii) *Exception:* In the event an inspection under [paragraph \(c\)\(2\)](#) of this section is not feasible due to existing set-up and configuration of the equipment (such as where an assist crane is needed) or due to site conditions (such as a dense urban setting), such inspections must be conducted as soon as it becomes feasible, but no longer than an additional 6 months for running ropes and, for standing ropes, at the time of disassembly.
- (3) If a deficiency is identified, an immediate determination must be made by the qualified person as to whether the deficiency constitutes a safety hazard.
 - (i) If the deficiency is determined to constitute a safety hazard, operations involving use of the wire rope in question must be prohibited until:
 - (A) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (B) If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
 - (ii) If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, the employer must ensure that the deficiency is checked in the monthly inspections.
- (4) The inspection must be documented according to [§ 1926.1412\(f\)\(7\)](#) (annual/comprehensive inspection documentation).
- (d) Rope lubricants that are of the type that hinder inspection must not be used.

- (e) All documents produced under this section must be available, during the applicable document retention period, to all persons who conduct inspections under this section.

EDITORIAL NOTE ON [PART 1926](#)

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§ 1926.1413 Wire rope—inspection.

(a) *Shift inspection.*

(1) A competent person must begin a visual inspection prior to each shift the equipment is used, which must be completed before or during that shift. The inspection must consist of observation of wire ropes (running and standing) that are likely to be in use during the shift for apparent deficiencies, including those listed in [paragraph \(a\)\(2\)](#) of this section. Untwisting (opening) of wire rope or booming down is not required as part of this inspection.

(2) *Apparent deficiencies —*

(i) *Category I.* Apparent deficiencies in this category include the following:

(A) Significant distortion of the wire rope structure such as kinking, crushing, unstranding, birdcaging, signs of core failure or steel core protrusion between the outer strands.

(B) Significant corrosion.

(C) Electric arc damage (from a source other than power lines) or heat damage.

(D) Improperly applied end connections.

(E) Significantly corroded, cracked, bent, or worn end connections (such as from severe service).

(ii) *Category II.* Apparent deficiencies in this category are:

(A) Visible broken wires, as follows:

(1) In running wire ropes: Six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay, where a rope lay is the

length along the rope in which one strand makes a complete revolution around the rope.

- (2) In rotation resistant ropes: Two randomly distributed broken wires in six rope diameters or four randomly distributed broken wires in 30 rope diameters.
- (3) In pendants or standing wire ropes: More than two broken wires in one rope lay located in rope beyond end connections and/or more than one broken wire in a rope lay located at an end connection.
- (B) A diameter reduction of more than 5% from nominal diameter.
- (iii) *Category III.* Apparent deficiencies in this category include the following:
 - (A) In rotation resistant wire rope, core protrusion or other distortion indicating core failure.
 - (B) Prior electrical contact with a power line.
 - (C) A broken strand.
- (3) *Critical review items.* The competent person must give particular attention to all of the following:
 - (i) Rotation resistant wire rope in use.
 - (ii) Wire rope being used for boom hoists and luffing hoists, particularly at reverse bends.
 - (iii) Wire rope at flange points, crossover points and repetitive pickup points on drums.
 - (iv) Wire rope at or near terminal ends.
 - (v) Wire rope in contact with saddles, equalizer sheaves or other sheaves where rope travel is limited.
- (4) *Removal from service.*
 - (i) If a deficiency in Category I (see [paragraph \(a\)\(2\)\(i\)](#) of this section) is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard. If the deficiency is determined to constitute a safety hazard, operations involving use of the wire rope in question must be prohibited until:
 - (A) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (B) If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.

- (ii) If a deficiency in Category II (see [paragraph \(a\)\(2\)\(ii\)](#) of this section) is identified, operations involving use of the wire rope in question must be prohibited until:
 - (A) The employer complies with the wire rope manufacturer's established criterion for removal from service or a different criterion that the wire rope manufacturer has approved in writing for that specific wire rope (see [§ 1926.1417](#)),
 - (B) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (C) If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
 - (iii) If a deficiency in Category III is identified, operations involving use of the wire rope in question must be prohibited until:
 - (A) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (B) If the deficiency (other than power line contact) is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. Repair of wire rope that contacted an energized power line is also prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
 - (iv) Where a wire rope is required to be removed from service under this section, either the equipment (as a whole) or the hoist with that wire rope must be tagged-out, in accordance with [§ 1926.1417\(f\)\(1\)](#), until the wire rope is repaired or replaced.
- (b) *Monthly inspection.*
- (1) Each month an inspection must be conducted in accordance with paragraph (a) (shift inspection) of this section.
 - (2) The inspection must include any deficiencies that the qualified person who conducts the annual inspection determines under [paragraph \(c\)\(3\)\(ii\)](#) of this section must be monitored.
 - (3) Wire ropes on equipment must not be used until an inspection under this paragraph demonstrates that no corrective action under [paragraph \(a\)\(4\)](#) of this section is required.
 - (4) The inspection must be documented according to [§ 1926.1412\(e\)\(3\)](#) (monthly inspection documentation).

(c) *Annual/comprehensive.*

- (1) At least every 12 months, wire ropes in use on equipment must be inspected by a qualified person in accordance with [paragraph \(a\)](#) of this section (shift inspection).
- (2) In addition, at least every 12 months, the wire ropes in use on equipment must be inspected by a qualified person, as follows:
 - (i) The inspection must be for deficiencies of the types listed in [paragraph \(a\)\(2\)](#) of this section.
 - (ii) The inspection must be complete and thorough, covering the surface of the entire length of the wire ropes, with particular attention given to all of the following:
 - (A) Critical review items listed in [paragraph \(a\)\(3\)](#) of this section.
 - (B) Those sections that are normally hidden during shift and monthly inspections.
 - (C) Wire rope subject to reverse bends.
 - (D) Wire rope passing over sheaves.
 - (iii) *Exception:* In the event an inspection under [paragraph \(c\)\(2\)](#) of this section is not feasible due to existing set-up and configuration of the equipment (such as where an assist crane is needed) or due to site conditions (such as a dense urban setting), such inspections must be conducted as soon as it becomes feasible, but no longer than an additional 6 months for running ropes and, for standing ropes, at the time of disassembly.
- (3) If a deficiency is identified, an immediate determination must be made by the qualified person as to whether the deficiency constitutes a safety hazard.
 - (i) If the deficiency is determined to constitute a safety hazard, operations involving use of the wire rope in question must be prohibited until:
 - (A) The wire rope is replaced (see [§ 1926.1417](#)), or
 - (B) If the deficiency is localized, the problem is corrected by severing the wire rope in two; the undamaged portion may continue to be used. Joining lengths of wire rope by splicing is prohibited. If a rope is shortened under this paragraph, the employer must ensure that the drum will still have two wraps of wire when the load and/or boom is in its lowest position.
 - (ii) If the qualified person determines that, though not presently a safety hazard, the deficiency needs to be monitored, the employer must ensure that the deficiency is checked in the monthly inspections.
- (4) The inspection must be documented according to [§ 1926.1412\(f\)\(7\)](#) (annual/comprehensive inspection documentation).

- (d) Rope lubricants that are of the type that hinder inspection must not be used.
- (e) All documents produced under this section must be available, during the applicable document retention period, to all persons who conduct inspections under this section.

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2. Nomenclature changes to part 1926 appear at [84 FR 21597](#), May 14, 2019.

§ 1926.1414 Wire rope—selection and installation criteria.

- (a) Original equipment wire rope and replacement wire rope must be selected and installed in accordance with the requirements of this section. Selection of replacement wire rope must be in accordance with the recommendations of the wire rope manufacturer, the equipment manufacturer, or a qualified person.
- (b) *Wire rope design criteria:* Wire rope (other than rotation resistant rope) must comply with either Option (1) or Option (2) of this section, as follows:
 - (1) *Option (1).* Wire rope must comply with [section 5-1.7.1](#) of ASME B30.5-2004 (incorporated by reference, see [§ 1926.6](#)) except that section's paragraph (c) must not apply.
 - (2) *Option (2).* Wire rope must be designed to have, in relation to the equipment's rated capacity, a sufficient minimum breaking force and design factor so that compliance with the applicable inspection provisions in [§ 1926.1413](#) will be an effective means of preventing sudden rope failure.
- (c) Wire rope must be compatible with the safe functioning of the equipment.
- (d) *Boom hoist reeving.*
 - (1) Fiber core ropes must not be used for boom hoist reeving, except for derricks.
 - (2) Rotation resistant ropes must be used for boom hoist reeving only where the requirements of [paragraph \(e\)\(4\)\(ii\)](#) of this section are met.
- (e) *Rotation resistant ropes* —

(1) *Definitions* —

- (i) *Type I rotation resistant wire rope (“Type I”)*. Type I rotation resistant rope is stranded rope constructed to have little or no tendency to rotate or, if guided, transmits little or no torque. It has at least 15 outer strands and comprises an assembly of at least three layers of strands laid helically over a center in two operations. The direction of lay of the outer strands is opposite to that of the underlying layer.
- (ii) *Type II rotation resistant wire rope (“Type II”)*. Type II rotation resistant rope is stranded rope constructed to have significant resistance to rotation. It has at least 10 outer strands and comprises an assembly of two or more layers of strands laid helically over a center in two or three operations. The direction of lay of the outer strands is opposite to that of the underlying layer.
- (iii) *Type III rotation resistant wire rope (“Type III”)*. Type III rotation resistant rope is stranded rope constructed to have limited resistance to rotation. It has no more than nine outer strands, and comprises an assembly of two layers of strands laid helically over a center in two operations. The direction of lay of the outer strands is opposite to that of the underlying layer.

(2) *Requirements*.

- (i) Types II and III with an operating design factor of less than 5 must not be used for duty cycle or repetitive lifts.
 - (ii) Rotation resistant ropes (including Types I, II and III) must have an operating design factor of no less than 3.5.
 - (iii) Type I must have an operating design factor of no less than 5, except where the wire rope manufacturer and the equipment manufacturer approves the design factor, in writing.
 - (iv) Types II and III must have an operating design factor of no less than 5, except where the requirements of [paragraph \(e\)\(3\)](#) of this section are met.
- (3) When Types II and III with an operating design factor of less than 5 are used (for non-duty cycle, non-repetitive lifts), the following requirements must be met for each lifting operation:
- (i) A qualified person must inspect the rope in accordance with [§ 1926.1413\(a\)](#). The rope must be used only if the qualified person determines that there are no deficiencies constituting a hazard. In making this determination, more than one broken wire in any one rope lay must be considered a hazard.
 - (ii) Operations must be conducted in such a manner and at such speeds as to minimize dynamic effects.

- (iii) Each lift made under [§ 1926.1414\(e\)\(3\)](#) must be recorded in the monthly and annual inspection documents. Such prior uses must be considered by the qualified person in determining whether to use the rope again.
- (4) *Additional requirements for rotation resistant ropes for boom hoist reeving.*
 - (i) Rotation resistant ropes must not be used for boom hoist reeving, except where the requirements of [paragraph \(e\)\(4\)\(ii\)](#) of this section are met.
 - (ii) Rotation resistant ropes may be used as boom hoist reeving when load hoists are used as boom hoists for attachments such as luffing attachments or boom and mast attachment systems. Under these conditions, all of the following requirements must be met:
 - (A) The drum must provide a first layer rope pitch diameter of not less than 18 times the nominal diameter of the rope used.
 - (B) The requirements in [§ 1926.1426\(a\)](#) (irrespective of the date of manufacture of the equipment), and [§ 1926.1426\(b\)](#).
 - (C) The requirements in ASME B30.5-2004 sections 5-1.3.2(a), (a)(2) through (a)(4), (b) and (d) (incorporated by reference, see [§ 1926.6](#)) except that the minimum pitch diameter for sheaves used in multiple rope reeving is 18 times the nominal diameter of the rope used (instead of the value of 16 specified in [section 5-1.3.2\(d\)](#)).
 - (D) All sheaves used in the boom hoist reeving system must have a rope pitch diameter of not less than 18 times the nominal diameter of the rope used.
 - (E) The operating design factor for the boom hoist reeving system must be not less than five.
 - (F) The operating design factor for these ropes must be the total minimum breaking force of all parts of rope in the system divided by the load imposed on the rope system when supporting the static weights of the structure and the load within the equipment's rated capacity.
 - (G) When provided, a power-controlled lowering system must be capable of handling rated capacities and speeds as specified by the manufacturer.
 - (f) Wire rope clips used in conjunction with wedge sockets must be attached to the unloaded dead end of the rope only, except that the use of devices specifically designed for dead-ending rope in a wedge socket is permitted.
 - (g) Socketing must be done in the manner specified by the manufacturer of the wire rope or fitting.
 - (h) Prior to cutting a wire rope, seizings must be placed on each side of the point to be cut. The length and number of seizings must be in accordance with the wire rope manufacturer's instructions.

