

How to inspect your wire ropes.

Despite their durability and strength, wire ropes used on cranes will wear out and need to be retired from service. That's why regular inspection is so crucial to your long-term success. It's important to appoint a qualified trained person to conduct the inspection and understand the mechanics of inspection. This section offers you general guidelines, but for more detailed information, please consult our Techreport 107.

HOW OFTEN TO INSPECT.

Obviously, the more you use a wire rope, the more often you need to inspect it. According to the ASME standards, owners or users are required to visually inspect all wire ropes at least once every day when in use. A qualified, trained person should be appointed to conduct the inspection. That person is also required to periodically inspect all wire ropes and keep a written record, noting any damage and recording when ropes are replaced. This will give you a basis for judging the proper time to replace your ropes.

We recommend you set up a long-range inspection program, including examination of ropes removed from service.

FOCUS ON YOUR ROPE'S CRITICAL POINTS.

While you're required to inspect the entire rope length, we recommend you pay particular attention to the critical points of a wire rope. These are the points subject to greater internal stresses, greater external forces or are more susceptible to damage. Rope deterioration normally occurs more quickly at these points, so it pays to expand your inspection in these important areas:

PICK-UP POINTS. These are sections of ropes repeatedly placed under stress when you apply the initial load of each lift such as those sections contacting the sheaves or on the drums.

END ATTACHMENTS. Attachments at the dead end and drum restrict the free movement of wires, normally leading to broken wires that are more difficult to detect. Inspect with an awl to expose them, and if you find more than one broken wire, replace the rope or cut off the affected area and reattach the fitting. Corrosion can be more prevalent in this area. Be sure to also inspect the fitting itself.

DRUMS. Check for signs of wear that could damage wire rope. For grooved drums, inspect the grooves for smoothness and absence of corrugation. For smooth drums, check for wire rope corrugation. It's also important to verify that the required minimum number of dead wraps remain on the drum and to check the condition of the drum flanges.

SHEAVES. The grooves on sheaves usually wear smaller over time. With a groove gauge, check each sheave for proper groove size and contour, as well as smoothness. Grooves that are too small or tight can cause pinching and increased wear while grooves that are too wide can cause flattening of the rope – both of which can reduce your rope’s life.

HEAT EXPOSURE. Watch for evidence of heat exposure which can damage

the rope and its lubricant. Any contact with an electrical arc such as welding is reason for removal of the entire rope. Never use the rope as the ground for an arc welder.

ABUSE POINTS. Check for “bright” spots where ropes are subjected to abnormal scuffing and scraping. Look for any condition that causes the rope to be asymmetrical.

> It’s important to remember there are minor – sometimes major – differences among applications, even on machines with similar designs.

That’s why it takes the best judgment of a trained, knowledgeable inspector to choose the critical points on each rope application for closer inspection.

HOW TO FIND BROKEN WIRES.

One of the most common signs of rope deterioration is broken wires, normally the outside wires at the crowns of the strands. During your inspection, it’s very important to search for broken wires, especially the areas of the rope in contact with sheaves and drums when loads are picked up.



Typical valley wire breaks.



Typical crown wire breaks.

1. The first step is to relax your rope to a stationary position, move the pick-up points off the sheaves. Clean the grease from the rope with a cloth – a wire brush, if necessary – so you can see any breaks.
2. Flex the rope to expose any broken wires hidden in the valleys between the strands.
3. Visually check for any broken wires. One way is to run a cloth along the rope to check for possible snags.
4. With an awl, probe between wires and strands and lift any wires that appear loose. Evidence of internal broken wires may require a more extensive rope examination.

When to replace your ropes.

According to the ASME B30.5 standard for mobile cranes, there are no precise rules to determine the exact time to replace rope because so many variables are involved. Once a rope reaches a specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgement of a qualified person. The rope should be replaced after that work shift at the end of the day – or at the latest prior to the equipment being used by the next work shift.

The following required standards established by ASME B30.5 that provide specific reasons to replace wire ropes.

BROKEN WIRES. For running ropes including XLT⁴ ropes, replace when you see six randomly distributed broken wires in one lay – or three broken wires in one strand in one lay.

For rotation resistant ropes categories 1, 2 and 3, replace when you see two randomly distributed broken wires in six rope diameters – or four randomly distributed broken wires in 30 rope diameters.

Broken wire removal criteria apply to wire ropes operating on steel sheaves and drums. The user should contact the sheave, drum or crane manufacturer for broken wire removal criteria for wire ropes operating on sheaves and drums made of material other than steel.

ONE BROKEN WIRE EXTENDING FROM ROPE'S CORE. When you see one outer wire broken at the point of contact with the rope's core which has worked its way out or looped out from the rope structure, you'll need to conduct additional inspection of that section of rope.

EXTENSIVE ROPE WEAR. When wear reaches one-third the original diameter of the outside individual wires, it's time to replace the rope.

ROPE DISTORTION. Replace any rope with evidence of kinking, crushing, birdcaging or any other damage resulting in distortion of the rope structure.

HEAT DAMAGE. Because heat exposure can damage the rope and its lubricant, always remove ropes damaged by heat from any cause.

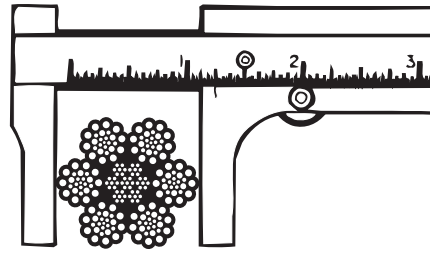
REDUCTIONS IN NOMINAL DIAMETER.

Replace any rope when its measured diameter has decreased more than 5% below its nominal diameter.

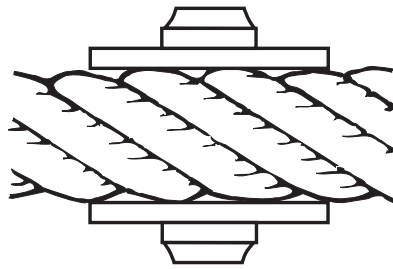
WHAT REPLACEMENT ROPE TO USE.

Your replacement rope should have a minimum breaking force at least as great as the original rope furnished or recommended by the crane manufacturer. Any deviation from the original size, grade or construction must be specified by the wire rope manufacturer, crane manufacturer or a qualified person. See pages 6-7.

WHAT ABOUT IDLE ROPES? All wire ropes that have been idle for one month or longer due to shutdown or storage of the crane on which they're installed should be inspected according to ASME standards before you place them in service. Make sure an authorized person inspects for all types of rope deterioration.



Always measure the largest dimension when measuring your rope.



Proper method of measuring ropes with odd number of outer strands, using caliper with plates.